45241

Amateur Radio

http://www.cq-amateur-radio.com

COMMUNICATIONS & TECHNOLOGY

JANUARY 2006

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100 Years of Phone, p. 18

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On the cover: Mark Jensen, KAØWTX, of West Fargo, North Dakota, checks the SWR of his...flagpole?? Details on page 90.

CQ WW RTTY WPX Rules and CQ WW WPX Rules Inside

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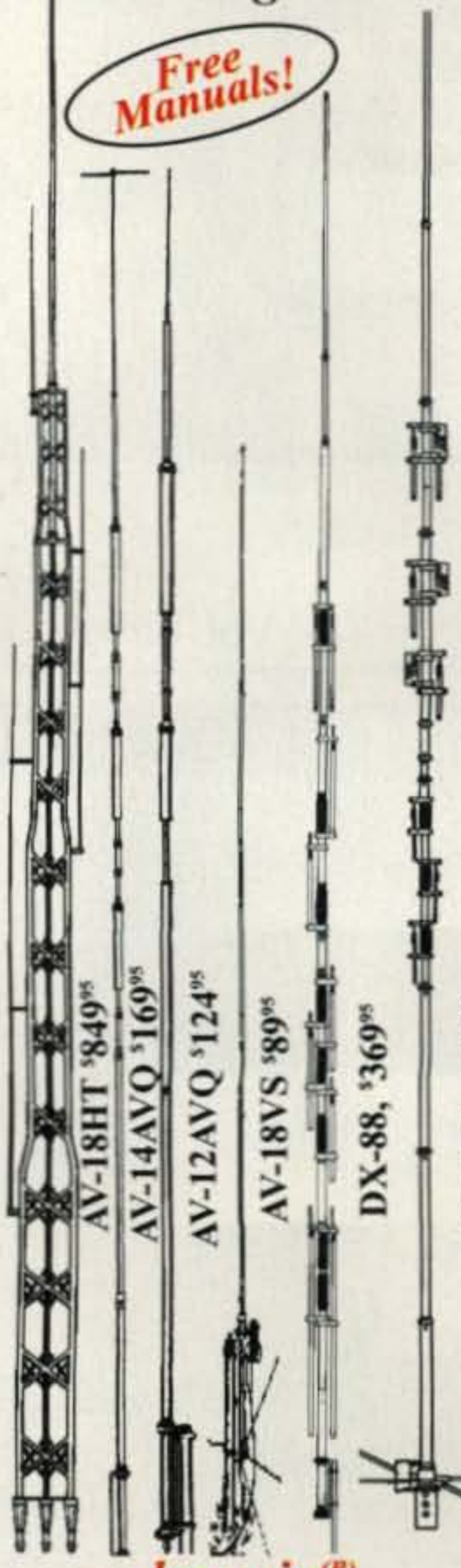


hy-gain(R)

Classics

All hy-gain multi-band vertical antennas are entirely self supporting -- no guys required.

They offer remarkable DX performance with their extremely low angle of radiation and omnidirectional pattern.

All handle 1500 Watts PEP SSB, have low SWR, automatic bandswitching (except AV-18VS) and include a 12-inch heavy duty mast support bracket (except AV-18HT).

Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators. Includes all stainless steel hardware. Recessed SO-239 prevents moisture damage. Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low. Two year limited warranty.

AV-18HT, $849.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

Standing 53 feet tall, the famous *Hy-Gain HyTower* is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stub-decoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) exists on all bands. Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. The addition of a base loading coil (**LC-160Q, $109.95**), provides exceptional 160 Meter performance. **MK-17, $89.95**. Add-on 17 Meter kit. 24 foot tower is all rugged, hot-dip galvanized steel and all hardware is iridited for corrosion resistance. Special tilt-over hinged base for easy raising & lowering.

AV-14AVQ, $169.95. (10,15,20,40 Meters). 18 ft., 9 lbs. **The** Hy-Gain AV-14AVQ uses the same trap design as the famous Hy-Gain Thunderbird beams. Three separate air dielectric Hy-Q traps with oversize coils give superb stability and 1/4 wave resonance on all bands. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

AV-12AVQ, $124.95. (10, 15, 20 Meters). 13 ft., 9 lbs. **AV-12AVQ** also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $89.95.

AV-18VS, $89.95. (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. **High** quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs.

All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $189.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

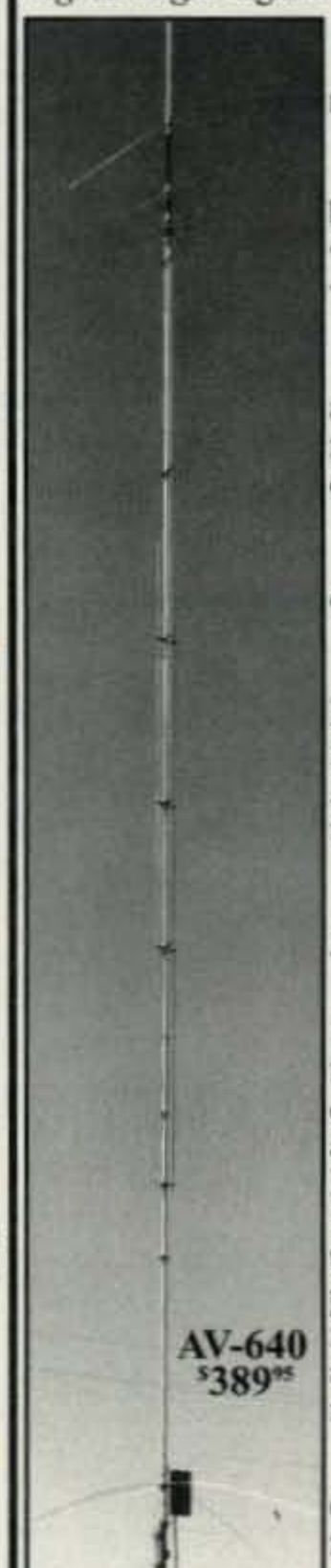
***No** ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$849.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

hy-gain®

PATRIOT

Hy-Gain's new PATRIOT HF verticals are the best built, best performing and best priced multiband verticals available today. For exciting DX make full use of your sunspot cycle with the PATRIOT's *low 17 degree angle* signal.



No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

Single coax cable feed. Each band is individually tunable. Extra wide VSWR bandwidth. End fed with broadband matching unit.

Sleek and low-profile

Low 2.5 sq. ft. wind surface area. Small area required for mounting. Mounts easily on decks, roofs and patios.

Full legal limit

Handles 1500 Watts key down continuous for two minutes.

Built-to-last

High wind survival of 80 mph. Broadband matching unit made from all *Teflon®* insulated wire. Aircraft quality aluminum tubing, stainless steel hardware.

hy-gain® warranty

Two year limited warranty. All replacement parts in stock.

AV-640, $389.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

AV-620, $289.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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HAM RADIO OUTLET

WORLDWIDE DISTRIBUTION

TUNE IN THE WORLD WITH ICOM

IC-R5 Wide Band Receiver

$5 HRO COUPON! $10 ICOM REBATE!

Winning Performance

- 150 kHz–1.3 GHz†
- AM, FM, WFM
- 1250 alphanumeric memories
- CTCSS/DTCS Decode
- Weather alert
- Dynamic Memory Scan (DMS)
- Preprogrammed TV & Icom's shortwave "Hot 100" channels
- Weather resistant
- Includes 2 AA Ni-Cds

IC-R3 Wide Band Receiver

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See and Hear All the Action

- 500 kHz–2.45 GHz†
- AM, FM, WFM, AM-TV, FM-TV
- 450 Alphanumeric Memories
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- 4 Level Attenuator
- Telescoping Antenna w/BNC Connector
- 2" Color TFT Display w/Video/Audio Output
- Lithium Ion Power

IC-R20 Wide Band Receiver

$5 HRO COUPON! $10 ICOM REBATE!

Winning Performance

- 150 kHz–3.3 GHz†
- AM, FM, WFM, USB, LSB, CW
- 1250 alphanumeric memories
- CTCSS/DTCS Decode
- Dual watch
- Audio recorder
- Dynamic Memory Scan (DMS)
- Preprogrammed TV & Icom's shortwave "Hot 100" channels
- Weather alert

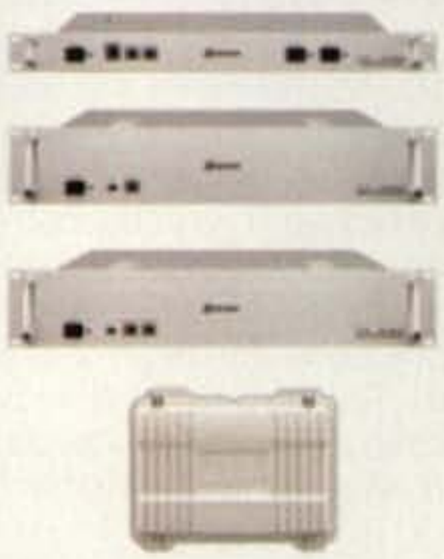
ID-RP2 Series D-STAR Repeaters

ID-RP2C Repeater controller
- Connects to ID-RP2V, ID-RP2D, ID-RP2L, and/or gateway PC

ID-RP2D Data repeater
- 1.2GHz digital data repeater

ID-RP2V Voice repeater
- 1.2GHz digital voice repeater

ID-RP2L Link repeater
- 10GHz microwave link repeater



IC-PW1 1kW Linear Amplifier

$50 HRO COUPON!

- Remote control head
- 100% duty cycle
- Auto antenna tuner

Can be used with *ANY* brand of HF, 6M, or HF/6M transceiver with ALC. 10M restorable with FCC license.

*706MKIIG not included

$10 HRO COUPON!

$10 HRO COUPON!

$5 HRO COUPON!

SP-23 External Speaker

Equipped with four selectable audio filters. Headphone jack.

AT-180 Automatic Antenna Tuner

HF/6M fully automatic tuner with 70 channel preset memories and "automatic tuner on" function when connected to the IC-706MKIIG.

Great for base as well as mobile installations! Tune your vertical beam or coax fed antenna from 160 Meters to 6 Meters*. A compact matching package for the IC-706MKIIG.

AH-4 Automatic Antenna Tuner

Specially designed to tune a long wire antenna for portable or mobile operation. Match a 7m + (23'+) long wire all HF bands 3.5 MHz and higher.

This tuner loves the great outdoors! Whether under your vehicle, or in a tree connected to a long wire, it's the perfect match for your IC-706MKIIG. It's compact, with watertight construction.

SM-20 Desktop Mic

Provides great audio to the transceiver. With low frequency cut capability.

$5 HRO COUPON!

ICOM

*Except 60M Band. **Cellular blocked, unblocked OK to FCC approved users. ✦Limited time only. Check with HRO for details or restrictions on any offers or promotions. ⊙Icom mail-in rebate. Please allow 6 to 8 weeks for rebate delivery. This is a limited time offer. ***For shock & vibration. © 2005 Icom America Inc December 05 CQ. The Icom logo is a registered trademark of Icom Inc.

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Store Hours: 10:00 AM – 5:30 PM Closed Sun.

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salem@hamradio.com

ham radio news

Federal Funds May Help Replace Storm-Damaged Repeaters

Certain amateur radio emergency communications systems may be eligible for federal grants to help replace hurricane-damaged equipment. According to the ARRL, an extension of the federal "Ham Aid" grant that helped cover some out-of-pocket costs for volunteers heading into hurricane disaster areas will also make funds available to help replace hurricane-damaged amateur radio emergency communication systems. Eligible systems include ARES-group or club-owned open-access repeaters, critical amateur radio infrastructure, or other essential communication backbone equipment damaged by Hurricanes Katrina, Rita, or Wilma. Interested groups must contact ARRL Chief Development Officer Mary Hobart, K1MMH, before December 31.

Disaster Volunteers Asked to Log Service

The ARRL has asked hams who provided communications during any recent disaster to log their service by filling out a form on the ARRL website (www.arrl.org). The goal, according to the *ARRL Letter,* is to document the thousands of volunteer hours and service provided by hams in disaster communication work. ARRL Chief Operating Officer Harold Kramer, WJ1B, says this information will send "a strong message that volunteer radio operators are essential to a successful response to any disaster."

Hurricanes Shut Down Vanity Call Processing

None of the hurricanes that did so much damage in the U.S. last year came anywhere near Gettysburg, Pennsylvania, but they managed to shut down the FCC's vanity callsign program until at least late December. According to the *ARRL Letter,* this is because the Commission has extended filing deadlines for license renewals for amateurs in areas affected by Hurricanes Katrina, Rita, and Wilma, which also extends the grace period on expired licenses in those areas. Since that can affect availability of callsigns under the vanity program, the FCC has suspended all vanity call processing until December 23 at the earliest.

Abernathy Leaves FCC

FCC Commissioner Kathleen Abernathy has stepped down as of December 9, joining former Chairman Michael Powell in leaving the Commission in recent months. Abernathy gained notoriety among hams two years ago when she described Broadband over Power Lines, or BPL, as "broadband Nirvana," despite mounting evidence that virtually all of the BPL systems in use at the time were causing significant interference throughout the HF radio spectrum. At press time, President Bush had not nominated a replacement for Abernathy on the FCC.

On the topic of BPL, *CQ* "Washington Readout" Editor Fred Maia, W5YI, reports in his column this month (page 44) that a new approach to BPL signal transmission—if widely adopted—may allow BPL and ham radio to peacefully coexist.

Comatose Ham Satellite Given OSCAR Number

The SSETI Express ham satellite has been designated as Express OSCAR-53 (XO-53) by AMSAT-North America, despite the fact that it went silent after five and a half orbits of near-perfect operation. *Newsline* reports that controllers are hopeful that the satellite may be able to recover on its own the ability to recharge its batteries, and if that happens, the radios may be able to come back to life.

ARRL Comments on Code Proposal Very Similar to CQ's

The ARRL has joined *CQ* magazine's publisher, CQ Communications, Inc., in calling on the FCC to retain a 5 word-per-minute code test for the Amateur Extra Class license, and if it removes the code requirement for General Class, to extend entry-level HF privileges to all Technician Class licensees. These are the privileges currently granted to Novices and Technicians who have passed the 5 wpm code exam. If the code test requirement for General is dropped, noted both the ARRL and CQ, there will be virtually no difference between Technicians with and without code credit, and therefore all Technicians should enjoy the limited HF privileges now granted to Techs with code credit. The League's comments were filed on the deadline for commenting on the FCC's proposal to eliminate the code test requirement altogether, but not to change any license privileges or to create a new HF-focused entry-level license. CQ had filed similar comments several weeks earlier.

"Dragon's Fire" QRM on 160

A wideband signal dubbed "Top Band Dragon's Fire" has been causing significant interference to amateur communications on the 160-meter band, according to the *ARRL Letter.* The signal, described as sounding like "a diesel motor with a ticking sound," is primarily causing interference to hams in Asia and Oceania, but has also been heard in the northwestern and northeastern United States. The source of the signal is still a mystery. Reports and recordings should be sent to Chuck Skolaut, KØBOG, at ARRL Headquarters, via e-mail to <cskolaut@arrl.org>.

Loveless Headlines ARRL Toy Drive

Country music star Patty Loveless, also known as KD4WUJ, has become the lead spokesperson for the ARRL/Salvation Army toy drive collecting holiday gifts for children left homeless or displaced by Hurricanes Katrina and Rita. The collection deadline was December 10, in order to assure that toys could be distributed in time for Christmas. Loveless recorded public service announcements for radio and television promoting the toy drive. The toys were being collected at a warehouse in Memphis, Tennessee for distribution throughout the affected areas by the Salvation Army.

ARRL Files Petition for Regulation by Bandwidth

After more than a year of seeking input from hams and developing, then refining, a draft proposal, the ARRL has formally asked the FCC to change the way it regulates amateur radio subbands from divisions based on operating modes to divisions based on bandwidth. On HF ham bands, the proposal would create subbands with maximum bandwidths of 200 Hz (current CW areas), 500 Hz (which would accommodate most current and anticipated HF RTTY and data modes), 2.8 kHz on 60 meters only, 3.5 kHz in the current phone bands (with an exception to permit AM signals with a maximum bandwidth of 9 kHz), and 16 kHz in the upper (FM) portion of the 10-meter band. There would be no specific mode restrictions as long as a signal did not exceed the maximum bandwidth, and semi-automatic RTTY/data stations would be permitted throughout the HF bands except those with a maximum bandwidth of 200 Hz. At press time, the FCC had not responded to the petition or issued it a Rule Making (RM) number.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

hy-gain ROTATORS

. . . the first choice of hams around the world!

HAM-IV

HAM-IV
$559.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum readability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of 2 1/16 inches.

HAM IV and HAM V Rotator Specifications	
WindLoad capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power (in lbs.)	800
Brake Power (in lbs.)	**5000**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	26
Effective Moment (in tower)	**2800 ft/lbs.**

TAILTWISTER SERIES II

T-2X
$649.95

T-2XD
$1029.95
with DCU-1

For large medium antenna arrays up to 20 sq. ft. wind load. Available with *DCU-1 Pathfinder* digital control (T2XD) or standard analog control box (T2X) with *new* 5-second brake delay and *new* Test/ Calibrate function. Low temperature grease, alloy ring gear, indicator potentiometer, ferrite beads on potentiometer wires, *new* weatherproof AMP connectors plus 8-pin plug at control box, triple bearing race with 138 ball bearings for large load bearing strength, electric locking steel wedge brake, North or South center of rotation scale on meter, low voltage control, 2 1/16 inch max. mast.

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power (in lbs.)	1000
Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
Effective Moment (in tower)	**3400 ft/lbs.**

CD-45II

CD-45II
$389.95

For antenna arrays up to 8.5 sq. feet mounted inside tower or 5 sq. ft. with mast adapter. Low temperature grease good to -30 F degrees. *New* Test/Calibrate function. Bell rotator design gives total weather protection, dual 58 ball bearing race gives proven support. Die-cast ring gear, stamped steel gear drive, heavy duty, trouble free gear train, North center scale, lighted directional indicator, 8-pin plug/socket on control unit, snap-action control switches, low voltage control, safe operation, takes maximum mast size to 2 1/16 inches. MSLD light duty lower mast support included.

CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power (in lbs.)	600
Brake Power (in lbs.)	**800**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	22
Effective Moment (in tower)	**1200 ft/lbs.**

HAM-V

HAM-V
$949.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

ROTATOR OPTIONS

MSHD, $99.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $39.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

AR-40

AR-40
$289.95

For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. 2 1/16 inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power (in lbs.)	350
Brake Power (in lbs.)	**450**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight (lbs.)	14
Effective Moment (in tower)	**300 ft/lbs.**

HDR-300A

HDR-300A
$1379.95

For ***king-sized*** antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power (in lbs.)	5000
Brake Power (in lbs.)	**7500**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight (lbs.)	61
Effective Moment (in tower)	**5000 ft/lbs.**

Digital Automatic Controller

DCU-1
$649.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1 degree accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

AR-35 Rotator/Controller

AR-35
$69.95

For UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

RBD-5
$29.95

NEW! Automatic Rotator Brake Delay

Provides automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents accidentally engaging brake while rotator is moving. Use with HAM II, III, IV, V, T2Xs. Easy-to-install. Includes pre-assembled PCB, hardware.

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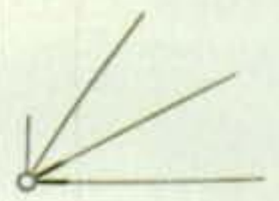

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

The University of Amateur Radio

First of all, wishes for a Happy and Healthy New Year to each and every one of you from all of us here at *CQ* magazine.

Last fall, I was helping teach a ham radio licensing course at one of our local universities, and as I walked back to my car after the first class, I realized how much ham radio is like a busy college campus. There were things going on everywhere. Classrooms were filled with students and professors, of course, but there was more. As I walked past the art building, I saw students working on projects. As I walked past the theater, there was a dance class going on in one room, while in the lobby, a few people were practicing dance moves on their own. People were busy everywhere, in many cases with a focus on learning by doing, rather than just reading a book or listening to a professor. Our own ham class blended right in. Yes, we spent some time in a classroom, but we also had gone to the roof to look at antennas and to the club station to listen to hams on the air to try to make a couple of contacts on our own. Even back in class, we split up at one point with HT-equipped hams spreading out with students to different parts of the building and giving everyone the opportunity to talk on the radio.

But it was the wide variety of activities—all going on separately but together in one location—that really caught my attention. I began to visualize the imaginary campus of the University of Amateur Radio.

An Imaginary Campus

In the international studies building, the DXers would be discussing the latest DXpeditions, techniques for breaking through pileups and, in the graduate-level courses, perhaps developing strategies for encouraging the growth of amateur radio in countries with reluctant governments, or maybe meeting with foreign regulators to discuss how ham radio can become a cornerstone of training for a developing country's own cadre of telecommunications experts.

Over in the social sciences building, a class of freshmen would be working on basic emergency communications techniques while in another class, students would be working with emergency management officials on integrating amateur radio into their communities' emergency response plans.

Meanwhile, at the earth science building, one group of hams might be studying gray-line propagation while another might be investigating long-delayed echoes, and yet another will be working on building antennas. Next door in computer science, classes might include how to build high-speed multimedia amateur networks, the latest developments in digital voice and digital techniques for meteor-scatter and moonbounce communications. Classes on circuit design and construction techniques would be under way in the electronic engineering building, as well as graduate courses in multiple receive sites and networking for repeaters.

Over at the radio sports center, contesters would be practicing for the next major on-air competition (or maybe planning a trip to some Caribbean island for "spring break"), while the football field was being used for antenna gain measurements and the foxhunting team was scattered around campus trying to track down a hidden transmitter.

All of these things *are* going on, every day, at the University of Amateur Radio, although not in a centralized location such as a college campus, and often, not in a formal classroom setting. We tend to be more like the dancers working out new steps on their own in the theater lobby. Another way that ham radio resembles a university is that being "admitted" –getting your license—really marks only the beginning of your education. Like college, ham radio is what you make of it. Many opportunities are offered, but it is up to you seek them out, although it's important for more experienced hams to offer guidance. As in college, your chances of success improve if you have an "academic advisor" for your studies at the University of Amateur Radio, someone who can—without necessarily being an expert in a given area—point you in the right direction for learning more about your area(s) of interest.

A Way of Thinking

Another major similarity is in the broad perspective of a university education. Beyond teaching specific facts and other information, a major goal of college is to teach students how to think in an organized way—how to approach, research, analyze and resolve a problem. Ham radio does the same thing. Ham radio teaches a way of thinking that emphasizes problem-solving, and figuring out how to meet a goal by using available resources. Hams know how to make things work and get things done, and learn not to be intimidated by machines with lots of parts. Everything works in a logical way.

For example, there's my washing machine, and being a ham just saved me from a big repair bill. The washer kept cutting off in the middle of a cycle. At first–using my ham thinking—I figured it was some bad switch contacts and tried skipping around the dial until it started working again. But there was no predictability to that, and I was about to put in for a service call when I finally realized that what *really* made a difference was whether I was leaning on the lid while fiddling with the dial! If I did, the machine often started up; if not, it generally didn't. That led me to the interlock on the lid, and the realization that the lid had warped somewhat over the years—so the little bar that pressed the interlock switch was out of line. A little twist to the inner lip with a pair of pliers solved the problem and saved us the cost of a service call. Without "ham thinking," I doubt I would have thought about the problem in a way that led me to figuring out that simple fix. This way of thinking can be applied not only to washing machines but to our jobs and other aspects of our lives as well.

A Few Differences

There are also some significant differences between the University of Amateur Radio and real colleges. First and foremost, there is no tuition. There are also no grades, no papers, no deadlines. If a "course" doesn't turn out to be what you expected, you can "drop" it at any time without a penalty. Plus, there's never a need to "declare a major," although many hams choose to do so, diving into a particular area of amateur radio with great gusto, sometimes becoming leading experts in that field, or perhaps "changing majors" after a period of time. Others, such as your editor, are "liberal arts majors," learning a little bit about a lot of things rather than specializing in one or two specific areas. (As a result, I know a little about a lot of things, and a lot about nothing!)

One other difference is that you never graduate. There are no degrees, no diplomas (no massive loans to pay off), just more knowledge and a greater understanding of part of our world and how it works. Being a ham should be a lifelong learning experience. In the class I was helping to teach, two of the other instructors were brand new hams themselves, having taken the same course earlier in the year. They taught not only to share what they'd learned but also to reinforce it by learning even more about their chosen topics in order to be better teachers. Make yourself a new year's resolution to be like them: Keep learning. Keep teaching. 73, W2VU

*e-mail: <w2vu@cq-amateur-radio.com>

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announcements

FARS Scholarships – The Foundation for Amateur Radio, Inc., with headquarters in Washington, D.C., plans to administer 54 scholarships for the academic year 2006–2007 to assist licensed radio amateurs. The foundation is composed of over 75 local area amateur radio clubs. Licensed radio amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college, or technical school. The awards range from $500 to $2500, with preference given in some cases to a specific geographical area or the pursuit of a certain study program. Additional information and an application form may be requested by letter or QSL card, postmarked prior to April 30, 2006, from: FAR Scholarships, P.O. Box 831, Riverdale, MD 20738.

HRU 2006 – Ham Radio University 2006 will be held Sunday, January 8, at Briarcliffe College, Bethpage, Long Island, NY. Highlights include keynote speaker Gordon West, WB6NOA, and 25 forums, including "Katrina Relief, Ham Radio Response," with the ARRL's Alan Pitts, W1AGP; "World Radiosport Team Championship 2006 in Brazil" with Jeff Briggs, K1ZM; "Computers and Ham Radio," with Rich and Nancy Rosner, N2STU, N2TKA: "Transmitter Hunting" with Larry Berger, WA2SUH; and more. Special event station W2V will be on, and there will be VE exams in the afternoon. For more information, go to: <http://www.hudson.arrl.org/nli>.

• **The following hamfests are scheduled for January:**

January 22, **Wheaton Community Radio Amateurs Midwinter Hamfest**, DuPage EXPO, St. Charles, Illinois. Contact WCRA, P.O. Box QSL, Wheaton, IL 60189; e-mail: <info@wheatonhamfest.org>; phone 630-604-0157; <http://www.wheatonhamfest.org>. (Talk-in 145.390; exams)

January 29, **Tusco ARC Hamfest**, 965 North Wooster Ave., Strasburg, Ohio. Contact Gary Green, K8WFN, 740-922-4454; e-mail: <k8wfn@tusco.net>. (Talk-in 146.730)

our readers say

ZAP! Electrical Safety Concerns

Editor, *CQ:*

In reading the October issue, I came across what appears to be a serious flaw involving electrical safety. In the feature "Math's Notes," the main subject is safety involving house wiring, which has what appears to be a departure from the current NEC (National Electrical Code). The main diagram does not comply with the concept of "Single-Point-Ground" as interpreted by my local power distributor, which is associated with the TVA. Specifically, the panel neutral and the Earth ground are not connected except through the earth between the transformer earth ground and the "water pipe" earth ground. This violates the local interpretation of the NEC. This needs a serious technical review; I think he is wrong, and in an article that is about wiring safety, this is serious.

Bill Aycock W4BSG
Woodville, Alabama

Editor, *CQ:*

You present an error in your October 2005 issue which will cause a danger to the readers! On page 28, the article "Electrical Safety Considerations" shows the common three-prong 120-volt plug and receptacle with the ground lug on the bottom. *It has been over 25 years that the code demands that the ground lug be on top!*

The reason for this is safety. Should a thin metal thing like a knife be dropped between the plug and the receptacle, it will hit the ground prong when the ground prong is on top. Should the ground prong be on the bottom, the knife would be in contact with the "hot" prong and possibly the "neutral." In either case, a person touching the knife could be in contact with the "hot" prong or cause a short to the "neutral" and flash which could cause injury, death, or a fire.

Yes, I know that in much new construction the "electricians" install the receptacles with the ground prong on the bottom. The electrical inspectors either aren't in existence or they overlook the errors for one reason or another.

Conrad R. Hilpert, Ph.D., P.E., KL7JKE
Butte, Montana

W2VU replies:

Thank you both for passing along your safety concerns. Please keep in mind that this was not a guide to running your own service drop or doing your own house wiring; it was a basic explanation of how everything works in a typical house electrical system to help hams working on equipment to do so safely. Conrad, as you point out, despite the requirements of the NEC, most electrical installations still have the ground prong on the bottom, so that is what most hams will be dealing with in their homes. Likewise, Bill, the "Earth Ground at Distribution Point" in the figure is not at the service drop point outside your house but rather at the pole holding the transformer. That pole may be too far away to share a ground connection with your house wiring.

That said, readers should certainly be aware of the need for a single-point ground for their home wiring, and particularly for the safety concerns relating to the orientation of the 3-prong grounding outlet. Thank you for sharing them with us. I, for one, am tempted to go around my house, shutting off circuit breakers and flipping over all of my "upside down" outlets!

FCC's License Exam Proposal

Editor, *CQ:*

I can't help but believe that the current onslaught of "THE FCC'S WRONG!" stuff I am hearing from all corners of amateur radio is itself detrimental to amateur radio and I read a lot of that in your "Zero Bias" for October 2005.

I'll not comment on the "code test" issue part of ZB, because if there ever was a deceased beast of burden that was collecting more than its fair share of continued flogging, that's it.

On your "Entry-Level Opportunity" comments, however, I have to ask, "What are you talking about"...?!?! Every month we see more and more pictures of licensed grade- and middle-schoolers, many of them Generals and Extras, in both *CQ* and *QST*. The exam pools are wide open, and it's never been easier to obtain an amateur radio license since the inception of licensing itself. My own spouse, W5AMY, passed her Technician Class license in only a weekend, and her General written with only two weeks of "study." I love my wife (yes, Baby, I do!), but she's about as technically competent and inclined as sawdust. Just how much easier can it get?

At the rate we're going, pretty soon we'll be down to "Two cereal box tops and 50 cents," but I am sure even then we will have someone complaining that the additional postage infringes on some right or disability or the trip to the mail box is a "hazing ritual." Let's stop the brain drain right here.

First of all, we need to re-establish the value of the amateur radio tests as a milestone of self-study and self-accomplishment. You and I are from the same era of operators, and you know as well as I do that at one time an amateur license carried with it some awe and respect because folks knew that it actually required the licensee to know something to get it.

The aforementioned open pools have zeroed that out. Evidence many community colleges that once accepted the amateur license for extra curricular/elective credit and no longer do...They know that the tests are compromised and the actual likelihood that the bearer holds any technical or theoretical knowledge is poor.

In particular, you suggest that kids already have too much on them and make specific reference to the number of *questions* in the Technician and General pools rather than the *content* of the questions! The *answer* to that is to actually *teach* the material and then *test* for comprehension of the material! It's *more work* for them to try and look for patterns in the *questions*, rather than actually understand what the question is asking them!

Amateur radio does *not* need yet another class of license, nor do we need another set of pool questions that will be an annoying speed-bump to those kids you make reference to.... *Challenge* them to learn this stuff! It's really fun and interstsing, but if we continue the way we're going, how will they ever know? Steve, K4YZ

In his past two CQ articles, W4YO has explored some of the fascinating historical events accounting for the deletion of several countries/entities from the ARRL's DXCC Country List. In this article, Ed looks at his personal DXing history, and how one DX contact changed the course of his entire career!

Recollections of a DXer

50 Years in the Pile-ups and Still Counting

BY EDMUN B. RICHMOND,* W4YO

This month marks my 50th anniversary as a licensed amateur operator, and as the date approached, I began to reminisce about what has transpired in my DX life since my first QSO in January of 1956. I pulled out my old logbooks and boxes of QSLs and relived some of those milestones which are the part of any DXer's world . . . my first out-of-the-country contact, working my 100th country, various certificates and awards, license upgrades, reaching the Honor Roll, DXing on 160, the changing Entity List, my various callsigns, and scores of other memories.

My first license was dated January 18, 1956 and had the call KN4HNA, when I lived in Lakeland, Florida. My station had been set up for weeks as I waited for that magical piece of paper to get to our mailbox. I had a Viking II transmitter and a Hallicrafters SX-24 receiver with a 40-meter dipole. When my license arrived on January 21st, I was on the air with a CQ on 15 meters within minutes of the mail delivery. No luck … try again … no luck. I called several stations, but still no one answered. I finally made my first contact with W1LIU in Massachusetts 26 minutes later, and I was off and running!

Before I was licensed, I had been an SWL beginning in 1948 and was already entrenched in listening for new countries in exotic parts of the world. It was quite natural, then, after receiving my FCC license, to start almost immediately on my quest for DXCC, or at least do so after I had become familiar with my station's capabilities and after I had made a bunch of stateside QSOs. My first out-of-the-country contact was VE3DYD, followed by CO2RC, both on 40 meters. The majority of my DXing, though, was on 15. One of my first DX contacts on that band was VQ4FK in Kenya, whom I worked during the ARRL CW contest. My rig was crystal-controlled, and I called for over an hour before I got his attention and made the QSO! One of my best Novice contacts was ZD3A in The Gambia. I remember it because just as he came back to me, the local garbage-collection truck pulled up to the house and obliterated the band with ignition hash! I closed my Novice logbook on June 9th, when my General Class license arrived. I was now K4HNA!

The author at his station in Miami in the mid-1960s. He received K4HNA after upgrading from his Novice callsign, KN4HNA. (Photos courtesy of the author)

That callsign served me for 14 years. I am fortunate to have operated during propagation Cycle 19, which truly brought spectacular, once-in-a-lifetime conditions. I remember working FQ8AF (my 100th country) on 10 meters CW when he was running 5 watts. I was still using the Viking II, although

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e-mail: <w4yo@arrl.net>

By the time he moved to the Atlanta area in the mid-1970s, Ed had been through a DJØ call in Germany and a W8 call in West Virginia. When he relocated permanently to 4-land in 1975, he applied for another 4-call and received W4MGN.

my receiver was now a Collins 75A2, and my antennas were a 20-meter quad, a three-element 15-meter Yagi, and a three-element 10-meter Yagi, all home-brew. My logs are full of prefixes and calls that are not heard any more. I recall having several AM phone QSOs with Joe, CN8IQ, who was stationed with the U.S. Navy in Port Lyautey, French Morocco. One night, Joe was playing Casino with a buddy at the same time he and I were in QSO. I told them I wanted to join the game, so Joe told me in Morse code which cards were on the table and which cards he held in his hand. I told him, also in Morse, which cards to play. We won several games using that system.

In the fall of 1961, I temporarily closed my station and traveled to Germany for a year of graduate study at the Free University of Berlin. I applied for, and received, a German license and was issued the call DJØGB. Several Berlin hams loaned me some equipment, and I was on the air with 10 watts. I used a vintage transmitter from a WW II German tank to a groundplane on the roof of my building at the Student Village. This was an exciting time because the Berlin Wall was being constructed, and I made sure I saw as much of it first hand as I possibly could. That was living history! I almost had an East German gas grenade thrown at me for shooting photos across the wall. One day I witnessed an American tourist being kidnapped and dragged into East Germany by two border guards, as he tried to snap a photo of East Berlin through an opening in the wall. He had accidently stepped over the white line painted on the street, which was the actual border (but that's another story).

I returned home in the fall of 1962 and wound up teaching languages at Miami Beach Senior High School. K4HNA was on the air again, now with a TA-33 beam at 40 feet. About a year later, I got rid of my AM carrier and went SSB with a Hallicrafters HT-32. There was lots of good DX on the air. Don Miller was at the zenith of his activity, along with Gus Browning and many others. Miami had a large number of good DXers, both pile-up savvy and technically gifted. A lot of us bought and modified surplus Motorola taxi radios, and we used them to set up a very successful DX alert net on 2 meters. I also learned the techniques of building a linear amplifier, and I hit the bands with 700 watts ... until that amplifier blew up in April 1965. I remember the date well, because it coincided with the activation of CEØXA, the first DXpedition to San Felix Island. I couldn't bust the pile-ups with my 100-watt exciter. Luckily, my friend Vic, K4SHB (now N4TO), lugged his boat-anchor Heathkit amp about 25 miles up to my QTH. We fired it up, and in only a few minutes I made my contact with the CEØ. A few days later, when the pile-ups had died down, I did have a bare-foot QSO with CEØXA on a different band.

I left Miami in the summer of 1967 to attend Northwestern University for a Master's degree program in linguistics. K4HNA returned to my parents' home in Lakeland, while I went to Evanston, Illinois. For nearly a year I was able to operate club station W9BGX at Northwestern one day a week to keep my DXing spirit satisfied. I received my degree in June 1968 and accepted a teaching position at West Liberty State College in the northern panhandle of West Virginia. I moved to the faculty housing and got permission to erect a 4BTV groundplane antenna, and on September 19th I became active as K4HNA/8. (In those days, DXCC had a distance rule. I couldn't claim any countries worked from the 8th call area for my 4th call area DXCC, so I started over![1]) This timeframe was also during the advent of Incentive Licensing, so I upgraded to Advanced Class.

In the summer of 1970 I became a permanent resident of West Virginia. Also in those days, if you moved to another call area, the FCC required that you apply for a new callsign. On September 20th I was assigned W8KGR. I moved to a hilltop; bought a three-element quad from Riki, K7ADD/3, who was moving to Israel (he's now 4X4NJ); mounted the quad (along with a 4BTV for the low bands) on a recycled telephone pole up about 40 feet; and traded my 75A2 for a 75A4 (I still have it!). K4HNA was no longer on the air.[2]

Ironically, two years later I was back in the 4th call area! I was accepted into the Foreign Language Education doctoral program at the University of Georgia, and I started to operate as W8KGR/4! The 4BTV was my only antenna, but with it I managed to work my 300th phone country with ZL3FM/VR1, in the British Phoenix Islands. I graduated from UGA in June 1975, and as luck would have it, I immediately obtained a position in the Modern Language Department at the Georgia Institute of Technology, in Atlanta. Another QSY. I bought a house in a small town east of Atlanta and changed my callsign again. On October 10th I became W4MGN and kept that call until November 1996.[3] It was the callsign with which I was associated for the longest period of my being a ham. My station now included an Alpha 76 amp, along with Yaesu FT-301 and FT-107M transceivers, and a 70-foot tower with my three-element quad from West Virginia. Later I added a four-element quad, which came crashing down in an

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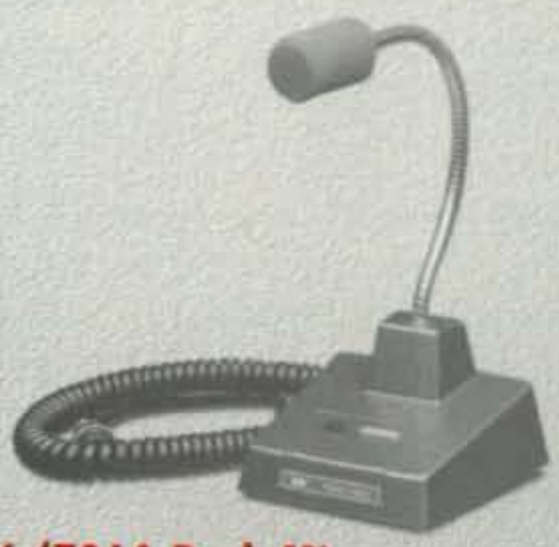

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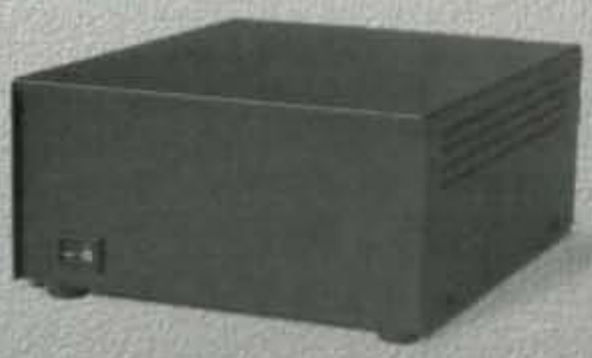

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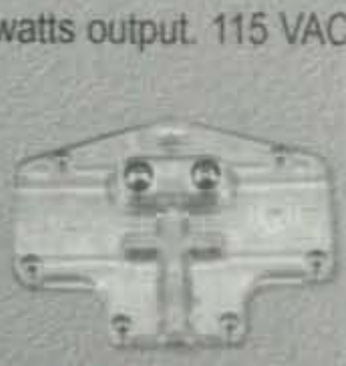

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The author's shack today in South Carolina, where he has yet another 4-call, W4YO. Note the mix of modern and vintage gear, some of which looks amazingly similar to the "new" gear in the earlier photos!

ice-storm, leading to the purchase of a KLM KT34XA. I also had three quarter-wave slopers for 75 meters and a shunt-fed antenna for 160.

A QSO That Changed My Life

In the spring of 1979 an event occurred which had a profound impact on my hamming and my teaching career. I had a contact with Keith, C5ABK, in The Gambia. We really hit it off, because I had always been interested in Africa and he had spent many years there. Our first contact lasted for over an hour. Several QSOs later, Keith told me he was flying to Atlanta to visit some hams and then to go to the Dayton Hamvention®. I told him that he could use my QTH as his American base of operations. We became fast friends, and he invited me to visit him in The Gambia in December of that year.

One of my research interests was in the field of National Language Policy and Planning. I wrote a letter to the then president of The Gambia, informing him of my upcoming visit to his country and volunteering my time to analyze the language component of the country's educational system. About three weeks later I received an invitation from the Gambian government. The Georgia Tech Foundation graciously paid for the flight, and I was on my way to the start of a great adventure which, over the next four summers, led me to more than 20 countries in Africa and the Indian Ocean. I was able to operate from most of them with my own African calls or as a guest operator. As far as my career is concerned, Language Planning became my prime source of research, and I was awarded a joint appointment with the Department of Modern Languages and the School of International Affairs, teaching in both entities, as well as being promoted to a full professor. During this time, in 1983 I upgraded to Amateur Extra Class and was first listed on the Mixed Honor Roll in June 1984.

In 1993, my wife Toni, WA4XYL, and I moved to a suburb south of Atlanta, and I put up an 85-foot tower. I also added a Collins 30L1 as a medium-power amplifier, giving me three levels of steam—i.e., barefoot, the Collins, and the Alpha. I remained at Georgia Tech for a total of 25 years and retired in 2000 as Professor Emeritus. In 1996, I applied for and received my present call, W4YO, through the Vanity Callsign program. In June 2001, we left Atlanta and moved to Harbor Island, a barrier island 14 miles out in the Atlantic Ocean, off the coast of Beaufort, South Carolina. No tower here, so I'm back hamming with a Gap groundplane. I started counting DX countries from scratch again, just for fun (so far 285 mixed).

Over my 50 years of hamming certain contacts stand out above thousands of others. I remember in 1959 reading in a DX bulletin about some activity from Syria by a Czech operator who had a weekly sked back home with his QSL manager. A few minutes before the appointed sked time, I blindly called the QSL manager on the sked frequency in the hopes of arranging a contact with YK1AT. I heard a station come back to me. It was YK1AT himself, and I very easily had another new one in the log with no pile-up.

On another occasion, in the mid-1960s while I was living in Miami, there was a lot of CW activity from FB8XX, but rarely did he operate on phone with anyone but French operators. Through an intermediary operator in France I made a sked with FB8XX on 20 meters at 0300Z. That night the band was absolutely dead! Only one weak PY was heard. At the appointed time FB8XX came on calling me on CW and he was 599, the only signal on a dead band. All the guys on the 2-meter link were calling me, and I had to turn off the link because I couldn't hear the FB8. Then my telephone started to ring. I made the contact on CW, and then we both switched to phone. I passed the calls of several of the guys on the 2-meter link and they made contact as well.

Most Memorable Moments

I think my most exhilarating contact came on April 12, 1982. I was tuning around on 15 CW and all of a sudden I heard BY1PK, a YL op named Jiao, making contacts with American stations. Unheard of! China never worked U.S. stations! The 2-meter alert frequency went wild, with guys listening to the BY and making comments, but no one attempted to work her. Jiao's frequency was a madhouse. At first I just listened to the activity in order to find out her *modus operandi*. She always slid off her last transmit frequency to work someone calling her on another frequency. I was ready for her and called her slowly with my straight key about 1.5 kHz up. Sure enough, she started calling W4MGN on my frequency. Magic! Several of us made the contact that evening, and we wondered if that was a "Slim" (a phony contact) and if we would ever get a QSL. About a month later I received an envelope from Gary, K4MQG, with my BY1PK QSL in it!

My most disappointing almost-QSO was on 160 meters. I don't remember the year, but I do remember the circumstances. It was on a February evening, and I tuned across Mike, K4PI, in QSO with someone. It was Ross, 9M2AX, on grayline propagation! When Mike turned it over to Ross, I could hear Ross beautifully. I waited until they signed with each other, and then I called Ross but didn't hear him come back. Someone else on the frequency sent

"MGN go ahead," but it was too late for me. Ross was gone. The path had closed. Every year after that, until we moved in 2001, from the last week in January until the end of February I made daily skeds with Ross, but I never heard him again on 160. We even e-mailed one another daily to compare conditions. What a bummer!

I have seen many changes in the DXing hobby. Among them are the transceiver, single sideband replacing AM phone, the appearance of the VHF DX alert systems, packet radio and other digital modes, meteor scatter and moonbounce, DX nets, and list operations, to name but a few. All seem to have their champions and their distracters. I'll let you decide the relative merits or demerits of each. Me? I'm just thrilled to be on the air, sitting in one place and talking to someone way on the other side of the world. It never ceases to amaze me, and in all of my 50 years on the air I have never lost interest in our great hobby.

I still get into the pile-ups. When I hear one, my pulse starts to race, my heart starts to beat faster, and the adrenalin starts to pump, just like it did 50 years ago. Depending on the rarity of the DX, I jump in and try to snag 'em. I guess it's force of habit, like an old, punch-drunk fighter hearing a bell and starting to swing. In my DX life, I've worked everything except North Korea and am missing a valid contact with Scarborough Reef on phone. I worked the Scarborough Reef team on their first expedition, which was later rejected by the ARRL. I play around with IOTA, especially since I live on an island, and I search out contacts with other stations with the –YO suffix. I have 36 of them so far.

However, I also remember the personal friendships made along the way, both here and abroad, such as the 300-plus QSOs and two "eyeballs" I have had over the years with Alain, F6BMV. Those feelings cannot be expressed in an article as short as this, nor can I present a list of the many callsigns with which those feelings are inextricably bound. That would require many pages more. 73 and good DX!

Notes

1. In an e-mail, Bill Moore, NC1L, wrote, "I think (the distance rule) was around 200 miles. In September 1977 that was changed to allow credits to count as long as they were from the same DXCC entity."

2. K4HNA is still an unassigned call.

3. W4MGN is also still unassigned, while W8KGR was reissued in June 2004.

It was 100 years ago, in 1906, when radio pioneer Reginald Fessenden introduced the public to what would become broadcast radio—the wireless transmission of voice and music. However, as author Bob Shrader, W6BNB, tells us, successful voice transmissions actually had been made earlier. Bob also explains how those early "phone" rigs worked and takes us through the development of radio voice communications since 1906.

A Century of TALKING on the Radio

Amateur Voice Communicating History

BY BOB SHRADER,* W6BNB

The first wireless voice transmissions were made in the 1880s and 1890s. Men such as Nathan Stubblefield and others played around with modulating magnetic field strengths for short-distance communicating. In 1900 Reginald Fessenden made his first antenna-type wireless voice transmissions, which were followed in 1906 by wireless music transmissions and the first public demonstrations, the best-known of which was his Christmas Eve broadcast of voice and music from his station at Brant Rock, Massachusetts. In 1907 Dr. Lee DeForrest for the first time patented a wireless "radio" form of voice transmission. From then on the old "wireless" voice and music emissions became known as radio emissions. Are our code transmissions really wireless and are only voice-modulated emissions radio? Hmm. . .

Somewhere in the first decade of the 20th century radio amateurs began to use voice-modulated emissions in addition to Morse code transmissions. They employed a radio-frequency (RF) generator of some kind. It might have been a vacuum-tube (VT) RF oscillator of one to maybe 10 watts output, or possibly a low-powered arc oscillator, or a low-powered high-frequency alternator as their RF-radiating device. Coupling such an RF generator to an antenna radiated a constant-amplitude or "continuous wave" (CW) RF AC carrier signal.

By connecting a varying-resistance telephone microphone between ground and an oscillator's quarter-wavelength antenna, it was possible to increase and decrease the RF radiated power at the voice frequency rate. This resulted in an amplitude-modulated (AM) radiated RF output. When spoken into, the diaphragm of such a microphone vibrated in and out, decreasing and increasing the resistance of the microphone from its normal approximately 200 ohms to a varying resistance of perhaps 5 to 400 ohms. This variation of resistance developed a varying RF power loss to the antenna from nearly zero to maybe 2 watts. As a result, the amplitude of the radiated RF carrier wave varied from its unmodulated value of 9 watts up to about 10 watts and down to perhaps 8 watts. A power variation such as this caused the received

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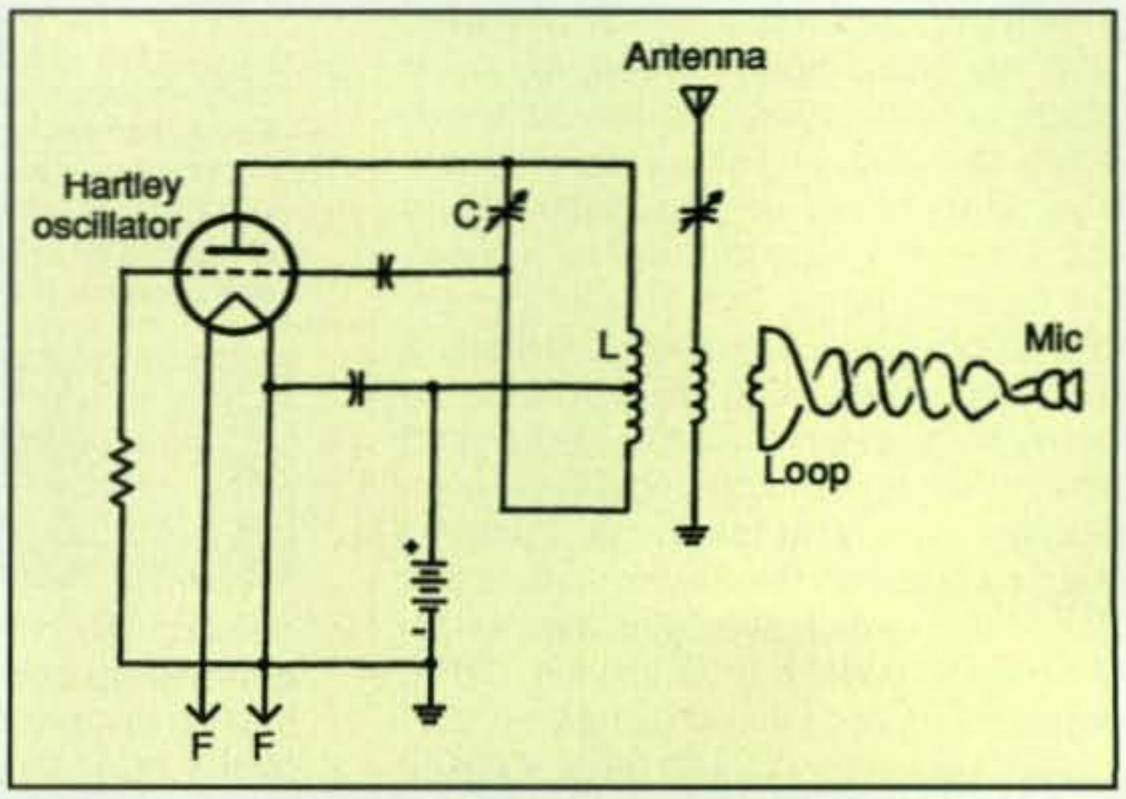

Fig. 1– A loop-modulated Hartley RF oscillator.

current in old-time crystal-detector earphones to vibrate their diaphragms at the same rate as the microphone diaphragm vibrated, reproducing the operator's voice, or any other audible modulating sounds.

The "double-button" microphones that were used consisted of two round, solid, flat carbon buttons with hundreds of tiny carbon granules between them. Cotton or other padding around the buttons prevented the carbon granules from dropping out. The back button was attached to the microphone case and the microphone diaphragm was attached to the front carbon button. Sound waves vibrating the diaphragm resulted in a variation of the granule resistance.

A somewhat similar modulating system that seemed to work better consisted of a two-turn loop of insulated wire coupled to an RF oscillator's resonant inductive-capacitive (LC) circuit coil, or around its antenna coil, if an antenna coil was used (see fig. 1). The loop was connected by a 2- or 3-foot twisted pair of wires to a carbon button microphone. In this way, RF AC power from the oscillator was fed to both the antenna and the microphone. Some RF AC power was radi-

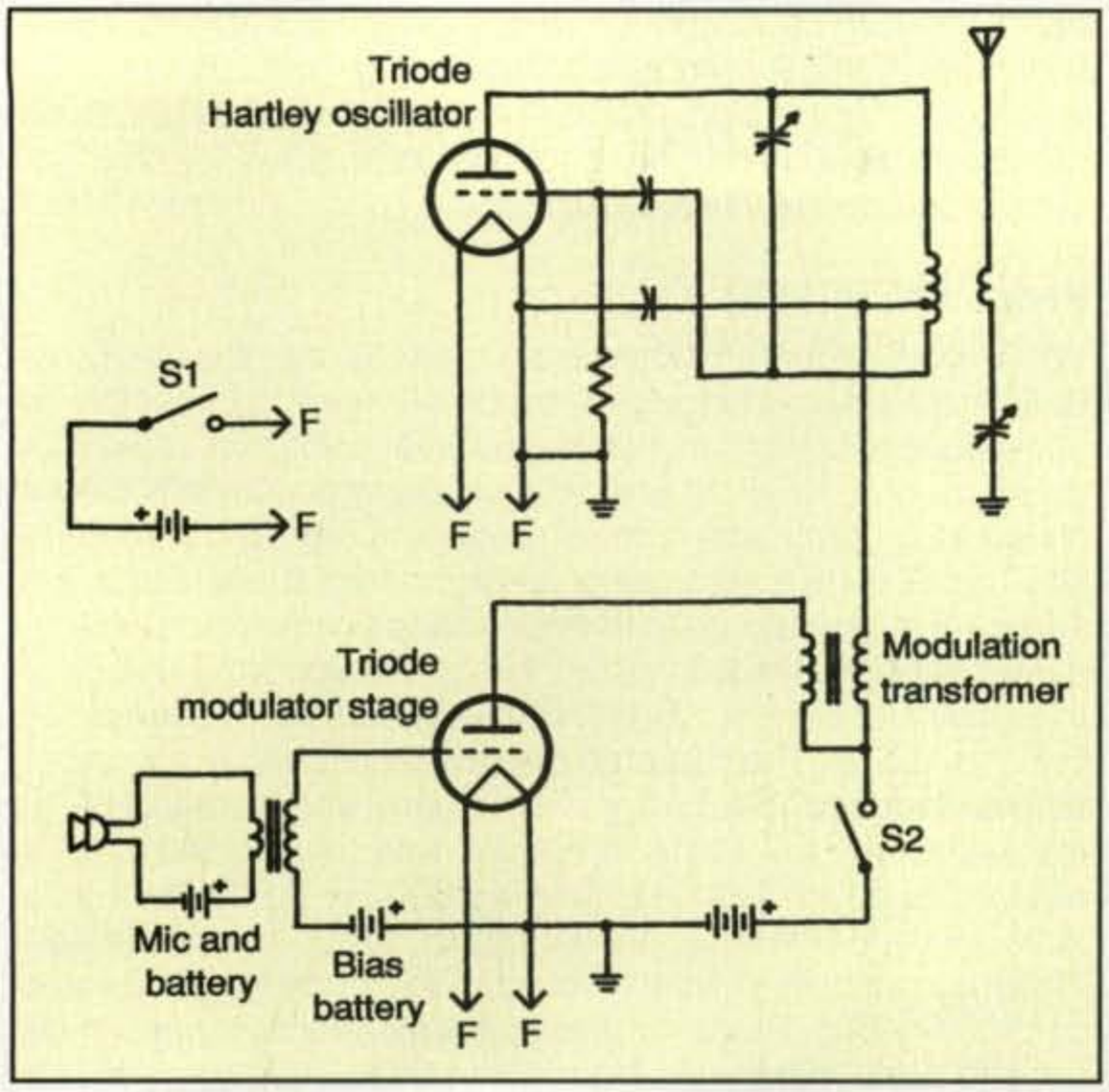

Fig. 2– A plate-modulated Hartley oscillator.

ated and some heated the carbon, again resulting in an amplitude modulation of the output RF signal. This was known as "loop modulation."

What those early operators probably did not appreciate was that the oscillator's frequency was also being varied back and forth, producing a frequency modulation (FM) that was more or less unknown at that time. With a little off-frequency tuning of a commonly used crystal-detector receiver, a reasonable amount of modulation of both AM and FM was heard. If an oscillator-RF-amplifier transmitter was used, no FM resulted, but received signals were not quite as loud.

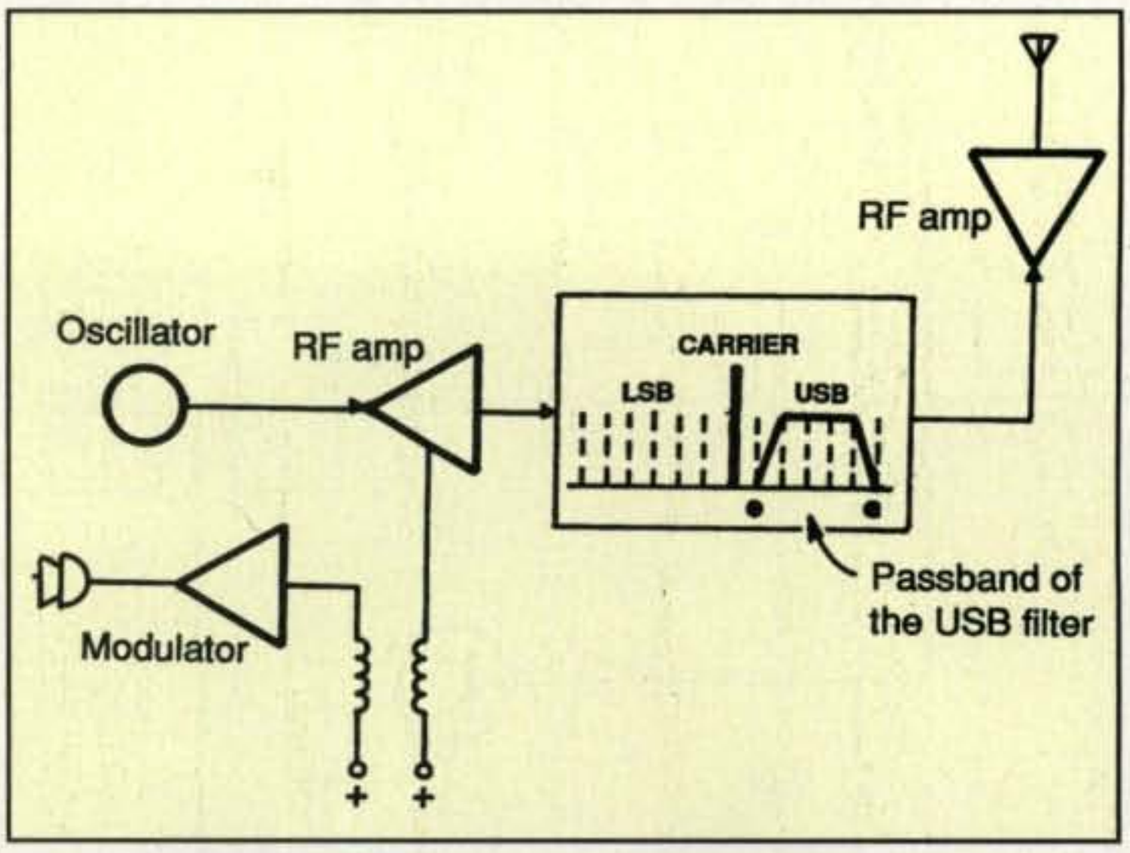

Fig. 3– Block diagram of a 7-MHz sideband transmitter showing the passband effect of a USB filter.

Plate Modulation

Just as the variation of the microphone resistance follows voice sounds, it can produce a varying direct current (VDC)

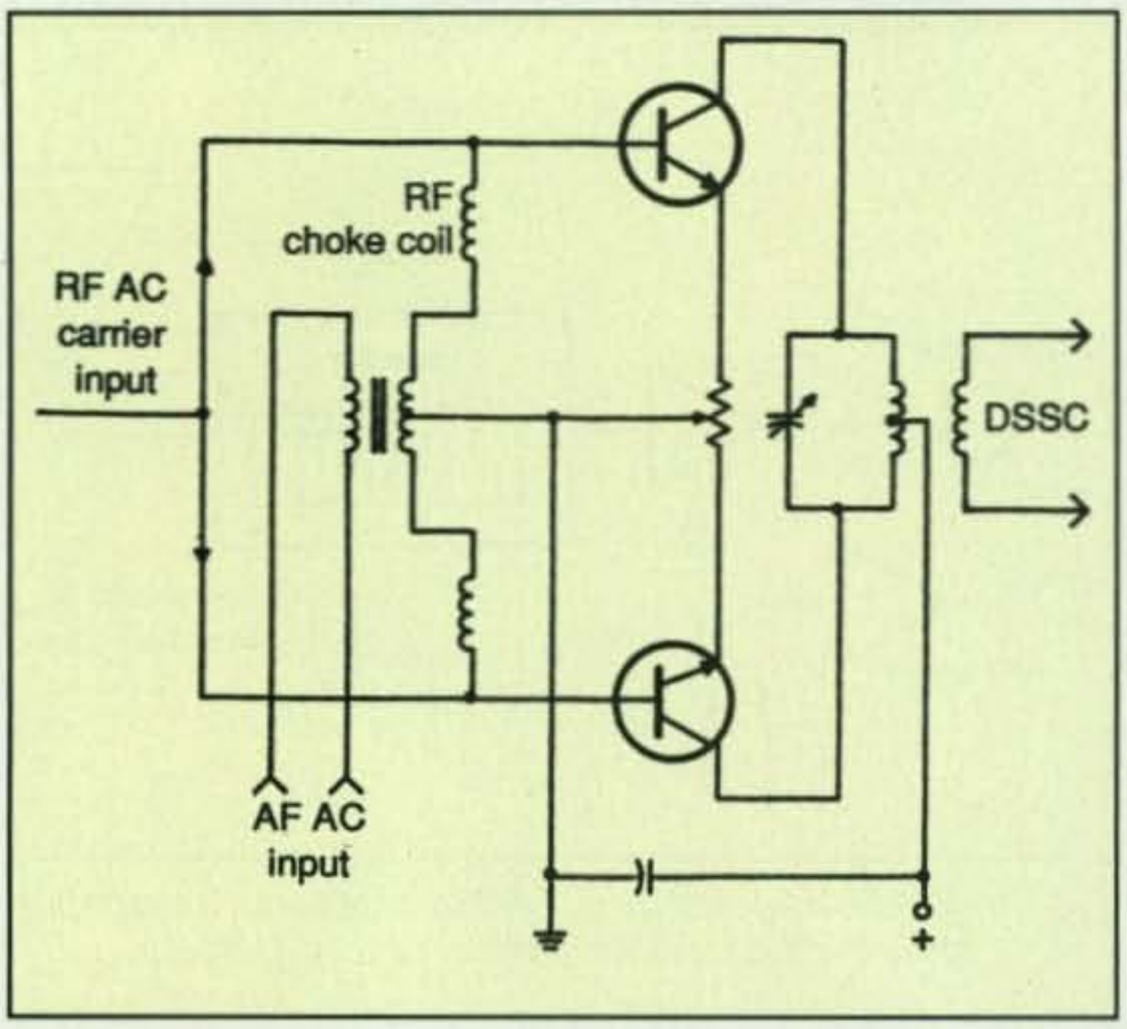

Fig. 4– A balanced modulator produces a DSSC (double sideband suppressed carrier) output.

in the primary of an audio-frequency (AF) transformer (fig. 2), developing an AF AC voltage in its secondary. Feeding this to the grid and cathode of a VT AF amplifier developed a much higher AF AC voltage across its plate-circuit transformer secondary. There were only vacuum tubes then, no transistors!

Fig. 2 shows a plate-voltage modulated Hartley oscillator. When switch 1 is closed, the filaments of the two tubes heat. Then when switch 2 is closed, the oscillator plate LC circuit starts oscillating, radiating an RF carrier wave from the antenna. Let's say the VT plate supply voltage is 100 volts. When a sound vibrates the microphone diaphragm, the AF AC out of this AF transformer is fed to the grid and cathode of the VT "modulator" stage and it produces a greatly amplified AF AC voltage across its plate-transformer secondary. If the AF AC peak voltage is 60 volts, then on its positive half cycle the oscillator plate voltage rises to 160 volts and on the negative half cycle the plate voltage drops to 40 volts. Any change of the oscillator plate voltage changes its RF power output. When the microphone is spoken into, it produces an AM RF AC output. In this case it results in 60% modulation. If the oscillator plate voltage decreases too much, the oscillator stops oscillating and the radiated signal becomes badly distorted. This can be corrected by using an RF oscillator driving a plate-modulated RF amplifier. The plate modulation can now be increased to 100%, producing louder received signals without distortion, or without any FM.

Voice frequencies range from about 200 Hertz (Hz) for a male bass singer to about 1160 Hz for a female soprano. However, a lot of second, third, and higher harmonic energy is also produced, making a reasonably high-fidelity voice range from 200 to about 3000 Hz. When such frequencies are produced in an AM circuit, they develop what are known as RF AC "sideband" signals on both sides of the carrier frequency. (A 500-Hz AF signal produces both an upper and a lower 500-Hz RF AC sideband signal.) Both upper and lower frequency voice sidebands are developed from close to the carrier frequency, up to about 3000 Hz. The "bandwidth" of an AM voice transmission is therefore: 2×3000, or 6 kHz. Satisfactory highest music frequencies used on the MF and HF AM broadcast bands may be up to about 5 kHz, producing a 10 kHz bandwidth. For high-fidelity music broadcasting, AF frequencies up to 7.5 kHz may be used, resulting in a 15-kHz bandwidth. (Kids of high-school age can hear sounds up to about 24 kHz, but elderly people may lose all frequencies over perhaps 4 kHz.)

From AM to SSB

When working in narrow amateur radio bands, it is desirable to limit the transmitting bandwidths as much as possible to allow more amateurs to use those bands. Whereas radiotelegraph, or CW, requires only a few Hertz of bandwidth, 3000-Hz amateur AM voice signals produce a bandwidth of 6000 Hz. This is quite a slice out of a narrow ham band. Since the same AF information is in both sidebands, why not use transmitters that only radiate either the upper sideband (USB) or the lower sideband (LSB)? This is what has been done since the mid-1950s. The radiated bandwidth of such an amateur single-sideband (SSB) signal is usually about 2800 Hz. (If the lowest AF AC starts at 200 Hz and the highest is only allowed to go to 3000 Hz, then a 2800-Hz [3000 Hz minus 200] bandwidth results, assuming no carrier is transmitted.) This may not be high fidelity, but it is adequate for good voice communicating. Some amateurs today seem to want to go back to using sidebands from about 50 to 5000 or so Hz for better voice quality. This is easily accomplished by using wider passband filters in the audio amplifiers, but at a cost of greater interference and fewer hams being able to use the bands.

Producing SSB and DSSC

How can only one sideband be produced? The actual circuitry in use may be quite complex, but the basic idea is fairly simple. Consider the block diagram in fig. 3. A 7-MHz RF amplifier's output is plate modulated by an amplified microphone signal. The result is a 7-MHz carrier plus USB and LSB RF signals. These are fed into a 7-MHz RF band-pass filter which passes only 7,000,200 to 7,003,000 Hz, attenuating all other frequencies being fed to it (the carrier and the other sideband). These band-passed RF frequencies are fed to an RF amplifier and on to the antenna as a USB signal.

If an LSB signal is desired, a band-pass filter passing only 6,999,800 to 6,997,000 Hz would be substituted. This is an explanation of how USB and LSB signals might be produced. Actually, the sidebands are produced at a much lower frequency to simplify the filters. They are then shifted to the desired bands by "frequency converters," "mixers," or "heterodyne" circuits.

To make sure that the strong carrier frequency is eliminated, a "balanced modulator" may be used to eliminate the carrier but leave the two sidebands (see fig. 4). This produces a double-sideband-suppressed-carrier, or DSSC, signal. Since the same RF AC is fed to both of the transistor bases in phase in the diagram, they cancel each other in the collectors' LC circuit. However, the AF AC is fed to the bases 180° out of phase through radio-frequency chokes, so they are not canceled. The result is no carrier, and only RF sidebands are developed in the output.

SSB Receivers

Listening to a SSB signal with a receiver using a normal AM detector produces no intelligence at all, because there is no RF carrier with which the RF SSB signals can mix to produce the original AF voice frequencies. To mix a local oscillator (LO) RF AC with received SSB RF signals normally requires

a "superheterodyne," or a two-mixer receiver (fig. 5). The "first detector" mixes the received RF signal with the LO to form an intermediate-frequency (IF), often at 456 kHz. The LO mixes with the received signal to produce the desired IF. The result of such AM mixed frequencies is fed to IF AC amplifiers and then to a "second detector," then to an AF amplifier, and finally to a loudspeaker. If an IF beat-frequency oscillator (BFO) is coupled to the second detector, it can provide the missing carrier frequency for SSB signals (or it can beat against CW signals) coming from the IF amplifiers.

If the passband of the IF amplifiers is 100 to 500 Hz wide, the receiver works well for receiving CW signals. If the passband is 2800 Hz, it works well for SSB signals. If 6000 Hz wide, it works well for amateur AM signals. If it is 10,000 Hz wide, it works well for HF or MF broadcast voice and music signals. The desired passbands can be produced by switching the output of the first detector to different IF band-pass filters and on to the IF amplifier(s) as shown. A balanced-modulator amateur transmitter would produce a DSSC signal, or both USB and LSB, but no carrier output. A good SSB receiver would demodulate either of the USB or LSB signals. Of course, DSSC signals have a 6-kHz bandwidth. However, if the USB is suddenly interfered with, a listener can switch to LSB and may eliminate the interference.

Surprisingly, a receiver set for SSB reception can be used to listen to distant AM broadcast or amateur signals around sunrise and sunset when "distortion fades" may sweep across the carrier frequency and cancel it. The BFO in such an SSB receiver can continually supply the missing AM carrier frequency, just as it does with SSB detection. Such AM signals may be only half as loud, may fade up and down, may have some lower and higher sideband frequencies attenuated as the fade frequency shifts across them, but the signals remain readable.

FM Transmitters

Frequency modulation as a voice form of communication came onto the scene relatively late, somewhere in the 1920s and 1930s, although frequency-shift keying had been used with spark and arc transmissions back in the early days.

Receivers of all of the forms of modulation discussed above detect variations in the strength of the signal. Detectors in AM receivers are sensitive to, detect, or "demodulate" not only AM, but also all kinds of amplitude noises produced by lightning, automobile ignitions, DC motors, and so on, which is undesirable.

If an RF AC carrier wave's frequency is modulated back and forth (rather than up and down in strength) or is "deviated," an FM receiver can demodulate it and will also be insensitive to amplitude noises. Basically, the louder the modulating voice AC in an FM emission, the further the carrier deviates from the center frequency. FM can be produced in many ways.

One of the simplest to explain would be to have a "condenser" (capacitive) microphone connected across the tuned LC circuit of a self-excited RF oscillator, such as a Hartley, Colpitts, etc. The microphone would have a stationary metal back plate and a movable metal diaphragm a short distance in

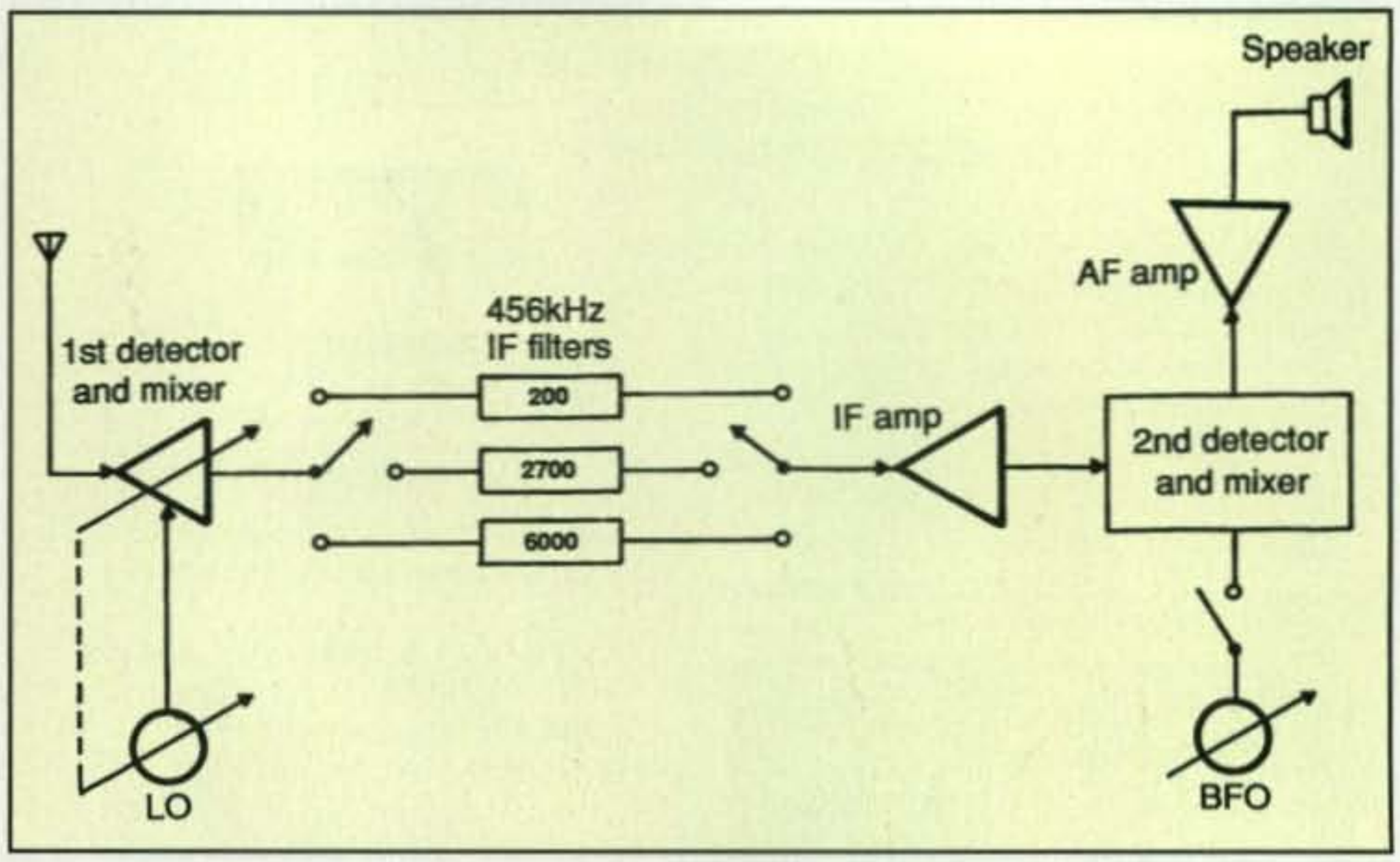

Fig. 5– Block diagram of a basic amateur superheterodyne receiver for CW, SSB, or AM.

front of it. Voice air waves would push the diaphragm in and out, varying the microphone's capacitance and therefore the frequency of the RF oscillator at voice frequencies. A "varactor" diode varies its capacitance with variations of the bias voltage applied across it and can also be used to produce FM if across a tuned LC oscillator circuit. An active device, VT or transistor, in a "Crosby" circuit can be made to look like a capacitive or inductive reactance when across a tuned RF LC oscillator circuit. Varying the signal input at an audio rate varies its reactance and the frequency of the RF LC circuit, producing an FM output. Most of our so-called "FM" transmitters start out being "phase modulated" (PM). Changing the phase of an LC circuit in some way changes its frequency slightly. By using a low-frequency PM RF oscillator and many RF frequency doublers and triplers, the final resulting FM can be wide enough to be at least a usable narrow-band FM in our higher frequency bands.

An AM transmitter modulated by a 500-Hz tone develops a 500-Hz sideband on each side of the carrier for a bandwidth of 1 kHz. An FM transmitter swinging its carrier frequency back and forth 500 times a second develops many sidebands of varying strengths on both sides of the resting frequency. Since there is no steady carrier, the FM RF energy is mostly in the varying strength sidebands, although there will usually be a small center frequency component in the transmitted emission. It is interesting that at one value of deviation the center frequency will drop to zero and all RF power will be in the sidebands; with a little more deviation, center-frequency RF appears again. FM bandwidths are much wider than AM, but FM sidebands weaken rapidly the farther they are from the center frequency. A comparable useful FM bandwidth is about three times that of an AM emission. An 18-kHz FM bandwidth would be about as useful as a 6-kHz AM bandwidth. Because of its wide bandwidth, FM is only used above 29 MHz and in wider higher frequency amateur bands.

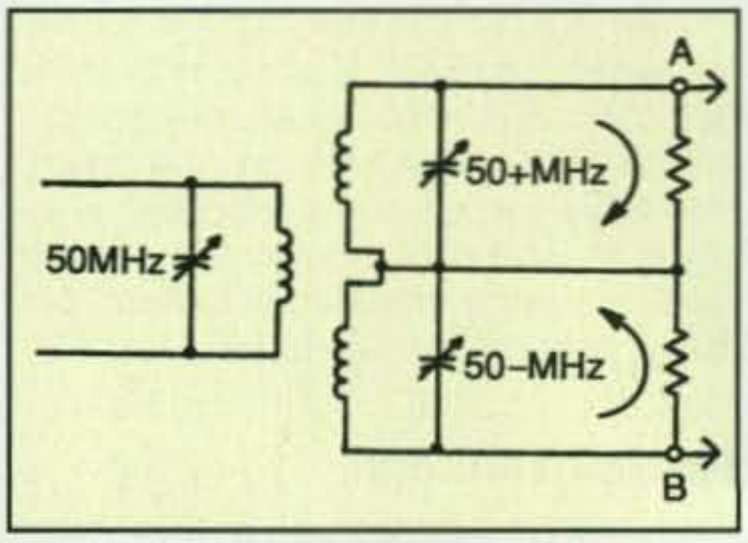

Fig. 6– A simple discriminator or FM detector circuit.

FM Receivers

As mentioned above, if a crystal-detector receiver is detuned from the carrier frequency of an AM signal that is also being frequency modulated, it will demodulate both the AM and the FM components. Such "slope detection" with an AM receiver will demodulate FM, but it is not very satisfactory and is sensitive to amplitude noises. Special FM "discriminator" detector circuits and "limiting" amplifiers are used to proper-

ly detect FM signals and eliminate amplitude noise pulses.

The simple "balanced" discriminator circuit in fig. 6 is a triple-tuned transformer. For simplicity, the primary circuit is tuned to an incoming 5-MHz FM signal. The center tapped secondary has its top resonant circuit tuned to 5.002 MHz and its lower to 4.998 MHz. Each secondary resonant circuit is coupled to its own resistive load through a diode. With no FM on the received carrier, the secondary load resistors have equal but opposite currents flowing in them, resulting in zero voltage from A to B. If the carrier deviates up in frequency, the higher frequency tuned circuit current increases and the lower frequency tuned circuit current decreases. The output voltage at A becomes negative in respect to B. When the carrier deviates down in frequency, the lower frequency circuit current will increase through its resistor, the upper resistor current will decrease, and A becomes more positive than B. Thus, the voltages across the two resistors reproduce the FM variations. A somewhat similar discriminator was the better known Foster-Seeley. Two others were the ratio and quadrature detectors. With the advent of ICs many new circuits are now being used.

A discriminator may detect FM signals, but it is also sensitive to noise pulses. To prevent this, usually the last two IF amplifiers of an FM superheterodyne receiver are limiter amplifiers. Basically, the lower the DC power supply voltages used on active device amplifiers the weaker their output. By limiting the DC used in these two amplifiers to very low voltages no IF signals can exceed those voltages. High-strength noise pulses cannot exceed the DC voltage either. This limits all incoming signals to the same strength, resulting in few, if any, noise pulses heard. FM transmitters and receivers are far more complex than these short, bare-bones explanations.

VHF amateur, police, aircraft, and other services use PM of HF oscillators, which when multiplied become VHF, UHF, etc., narrow-band FM. Wide-band broadcast FM is used *commercially* around 100 MHz. The video part of TV is AM, but the audio is sent as FM, which is why TV pictures may show noise on the screen but the audio is always noise free.

Digital Voice

After all the progress made in developing and improving radio voice transmission in the first half of the 20th century, there was surprisingly little in the second half, until the advent of digital voice (DV) in the 1990s. Harnessing the amazing power of computers and microprocessors, DV takes the concept of SSB a step further. Rather than suppressing the carrier (and one sideband) in the transmitter and then reinserting it in the receiver to make the signal understandable, digital voice modulation converts the analog signal from the microphone—through an analog-to-digital (A/D) converter—into a digital datastream that is then transmitted over the air. In an analog receiver it sounds like noise. At a digital receiver, though, the incoming data is sent through a digital-to-analog (D/A) converter, which reassembles it into an analog audio signal that is then sent to a speaker or headphones.

There are many potential benefits to this technology, which amateurs are just beginning to explore. However, as recent experience with Hurricane Katrina showed us, when fancy digital public-service communication systems failed, old reliable analog radio can often be the only thing that still works in the wake of a natural or manmade disaster that wipes out significant parts of the communications infrastructure.

Summary

The ability to transmit and receive voice, music, and later moving pictures by wireless turned radio (and its cousin, television) from a utilitarian communications tool into a news and entertainment medium that changed our world. From an amateur radio perspective, it permitted us not only to hear the words and thoughts of our fellow hams in different places, but to hear their voices as well, helping with our FCC-mandated mission of promoting international goodwill. Here's hoping that we all can keep talking to one another, through whatever changes technology may have to offer, for at least another hundred years to come. ■

Results of the 2005 CQ WW WPX SSB Contest

BY STEVE MERCHANT,* K6AW

Last year marked the 47th running of the CQ WW WPX SSB Contest. Despite declining sunspot activity, the number of logs submitted went up again from the previous year and contestants managed to set 23 new records in various categories. Al, 4L5A, as D4B set another Single-Op All Band (SOAB) world and continental record from the Cape Verde Islands in what may have been his last WPX SSB contest for some time. We all have enjoyed working Al in many contests over the years and will miss his enthusiasm and competitive spirit.

The PJ2T Multi-Op Two-Transmitter team. In front, left to right, Geoff, W0CG; Helmut, DF7ZS; and Heiko, DK3DM; rear, left to right, Wolfgang, DK9VZ and Uli, DL8OBQ; missing from the photo is Harald, DL2SAX.

DX

D4B took the top SOAB spot. Al's latest world and continental record surpassed second-place 9Y4W (Jaroslav, OM3TZZ) by over 8 million points. In third place was 8P9AM with a new continental record (Sergei, MØSDX op), followed by FY5KE, operated by Oliver, F5MZN. Aruba made it into fifth place again with John, KK9A, operating the only low-power top-ten entry, P40A. Sixth place went to VC3A (Ron, VE3AT) and seventh to world-traveler Olli, OHØXX/EA4BQ operating from 8R1K. In eighth place was Bernd, DL6FBL. WP2Z (Stan, K8MJZ) was number nine, and Goran, S55OO, finished up the top ten as S58A.

The top spots in the 10-meter category were won in a battle fought in South America. Juan, LU1HF, was the clear winner, almost 1.5 million points ahead of number two, PT5Z (Ari, PY5NW). Third place was won by Roberto, CE4PBB, and Claudio, LU5FII, and Elvis, PY2SBY, took fourth and fifth place, respectively. On 15 meters it was a rout, not a battle. Jim, N6TJ, went to ZD8Z and demolished all comers, setting a new world and continental record with over 17 million points and almost 1200 mults. Jim's 15-meter single band score would have placed him fifth in the world in the SOAB category. Second place was won by Marcelo, PY1KN, and third went to Juan, EA8CAC, as ED8CAC. In fourth place was Rafael, KP4WW, and fifth went to low-power entry ST2T (Dane, S57CQ). On 20 meters the clear winner was EA8EW, operated by Toivo, ES2RR. There was a close battle for second place, with Antonio, CT8T, edging out Vaho, 4L8A. The race for fourth and fifth was even closer, with Vitor, PY2NY, narrowly beating Claus, OE6Z. The 40-meter competition was almost as lopsided as 15 meters. CN2R, operated by Jim, W7EJ, set new world and continental records and took the top spot with a 6.5 million point lead over second-place TI4CF, who also set a new continental record (TI2CF, Carlos). Third place was won by Pekka, OH1RY, operating AN8AH. Fourth went to 4M5DX (Alexis, YV5SSB op) and fifth to UU7J, operated by Andy, UU4JMG. The top five 80-meter spots were closely fought over, with SN3A (Jurek, SP3GEM) winning; followed by 9A5Y (Jan Hus, 9A3LG) second; 4N8A (YU1EA op) third; Krzysztof, SN7Q, fourth; and Robert, 9A5E, in fifth place. Top band honors went to Kaz, SP2FAX, as SO2R in first place and a new world record; Pavel, OK1MU, operating OK5DX second; Ozer, TA2RC, operating low power YMØT for third place and a continental record; Slavko, S57DX, fourth; and Bojan, S57M, fifth.

Once again the world low-power SOAB honors went to John, KK9A, operating P40A. Second place went to Jurgis, LY2CY, as V25O. CT7B (CT1ILT, Filipe) was third, VQ5L (LA9HW, Jan) fourth, and NK4A (N4PN, Paul) fifth. In sixth place was Hartwig, CN2BC; with LR1F (LU5FD, Daniel) seventh; Igor, UA4FER, eighth; NV1N (N1UR, Ed) ninth; and Mamuka, 4L2M, as tenth in this category.

Claudio, LU5FII, won the low-power 10-meter category by a narrow margin, followed by Elvis, PY2SBY, in second place and L44DX (Esteban, LW1DTZ) in third. LU1FS, Fabian, was fourth and LU6HPF, Alejandro, was fifth. On 15 meters low power Dave, S57CQ, took first place as ST2T, followed by Matias, LU5EML, in second and Alfredo, WP3C, third. Mohammad, YB1BAD, was fourth, and fifth place went to Sutaryono, YB2OBL. The first-place 20-meter low-power winner won by a narrow margin—Yuriy, KC2NTB, edged out his second-place rival, Vlad, 4N1N, by only a few thousand points. Third place went to Alex, UA9LAU, and fourth was YP8A, operated by Gabi, YO8TU. Jozsef, YU7ZZ, was in fifth place. The 40-meter low-power winner and new record holder was Dal, T94DO, with Kaye, DU9AXJ, as 4D9D second and a continental record, and Ladi, OK1DCF, third, operating as OL6T. Branko, YT1LT, took fourth place and Zoran, YZ1ZV, operating as YU1AAV was fifth. Eighty meters and a new world record was won by YT1AD (Miki,

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YU1AU op), with 7S7V (Samir, SM7VZX op) in second and LY5A (Jonas, LY2PAJ) third. Vojislav, YU7AV, took fourth place and Vinko, S53F, was fifth. The 160-meter low-power category was easily won by YMØT, operated by Ozer, TA2RC, with Brian, VE3MGY, in second and a new continental record. Claudiu, YO5OHZ, was third; Damir, 9A3RE, fourth; and fifth place was won by Jaromir, OK2HZ.

The Tribander-Single Element category is alive and well. ZX2B (PY2MNL, Wanderly) crushed his competition by more than a 2 million point margin. Emily, P43E, was second, and Tomas, ZP5AZL, was third as ZPØR. Diego, AY8A, took fourth place and Joel, KG6DX, was fifth. Istvan, HAØDU, took sixth place; Dave, NP2I, was seventh; Tony, VK3TZ, was number eight; Krassy, K1LZ, was ninth; and Yuri, UA4LCQ/9, was number ten and the only low-power entry in the top ten this year. The 10-meter winner in the TS category was Vlad, UN5J. The 15-meter winner was Bill, KG4WW, followed by Steve, ZC4LI, in second, and the low-power entry by Bob, K8IA, in third place. Twenty meters was won by Jari, OH3BU, with low-power entries from Ryan, NV8N, in second and Scott, VE1OP, third. On 40 meters the winner was Mike, N2GC. On 80 meters Ymanol, YV5YMA, won with his low-power entry, followed by Mike, GU4EON, in second place. The lone 160-meter winner was the entry from YT2W.

The 2005 Rookie category winner was a low-power entry from CT7B, operated by Filipe, CT1ILT, with a huge margin over second-place Valery, UN7MMM, and Dmitry, UW1GZ, in third place. Low-power entries from Woy, SQ9JKW, and Yuri, UR5MNZ, made up the fourth and fifth place spots.

Single Op Assisted was totally dominated this year by Emir, OE1EMS, operating as OE4A. In second place was Yuri, UA9AM, operating RG9A followed by LO2F (Lucas, LU1FAM), RL3A (Ruslan, UA3ASZ) fourth, and Stefan, DL1IAO, completing the top five spots. The 10-meter Assisted winner was LQ5H (Victor, LU3HS op), with Bruce, W3BP, second, operating as KM4M. On 15 meters Milos, 4N1SM, won quite nicely, followed by Vlad, YT1BB, and Alex, YO9HP. On 20 meters Kristjan, S57IIO, battled to a very close first-place finish with Wolfgang, OE2VEL, as OE2S. Mike, DL3NED, finished in third place. The 40-meter top spot in SO(A) went to Erwin, OM7PY, with Tomi,

WORLD TOP SCORES

WORLD TOP SCORES SINGLE OPERATOR ALL BAND

D4B (4L5A)	26,871,482
9Y4W (OM3TZZ)	18,548,160
8P9AM (MØSDX)	18,516,316
FY5KE (F5MZN)	17,344,264
*P4ØA (KK9A)	13,738,890
VC3A (VE3AT)	11,545,368
8R1K (EA4BQ/OHØXX)	10,330,480
DL6FBL	9,750,351
WP2Z (K8MJZ)	9,609,516
S58A (S55OO)	9,561,284
OK1RI	9,330,220
KQ2M	9,089,410
WK4R	8,883,951
VE3DZ	8,291,058
ZX2B (PY2MNL)	8,174,796
OHØZ (LY2TA)	8,130,528
VO1AU	8,056,636
K4ZW	7,107,828
*V25O (LY2CY)	7,051,968
KC3R (LZ4AX)	6,758,540

28 MHz

LU1HF	4,434,977
PT5Z (PY5NW)	3,185,359
CE4PBB	1,857,600
*LU5FII	1,169,412
*PY2SBY	1,155,296
*L44DX (LW1DTZ)	1,149,705
*LU1FS	1,119,144
*LU6HPF	1,091,076
V31LZ (LZ1MS)	779,943
5B/MØXAA	748,500

21 MHz

ZD8Z (N6TJ)	17,129,112
PY1KN	7,503,520
ED8CAC (EA8CAC)	5,253,402
KP4WW	4,934,388
*ST2T (S57CQ)	4,594,725
*LU5EML	3,639,916
ZF1A (W6VNR)	3,324,260
KG4WW	3,108,072
CX7BY	2,792,698
WP3C	2,261,376

14 MHz

EA8EW (ES2RR)	8,719,848
CT8T	6,703,695
4L8A	6,279,069
PY2NY	4,922,663
OE6Z	4,675,242
EM7J (UT5UGR)	4,452,126
W7WA	3,797,420
OH8NC	3,652,294
N3HBX	3,623,628
VE6WQ	3,117,516

7 MHz

CN2R	14,724,696
TI4CF (TI2CF)	8,057,479
AN8AH (OH1RY)	7,120,487
4M5DX (YV5SSB)	3,789,672
UU7J (UU4JMG)	3,389,358
YT7A (YU7GMN)	2,633,995
4N2Z	2,626,008
S59KW	2,105,473
S51OI	1,968,800
VA7RR	1,912,106

3.7 MHz

SN3A (SP3GEM)	2,369,664
9A5Y (9A3LG)	2,088,889
4N8A (YU1EA)	2,034,630
SN7Q	2,031,386
9A5E	2,018,250
S5ØC (S53MM)	1,602,152
HG8R	1,505,916
*YT1AD (YU1AU)	1,268,064
YZØZ (YU1ZZ)	1,092,000
Z36W	972,704

1.8 MHz

SO2R (SP2FAX)	756,105
OK5DX (OK1MU)	635,660
*YMØT (TA2RC)	486,846
S57DX	431,313
S57M	406,065
UT3SA	194,416
*VE3MGY	170,754
CT9M (CT3KY)	148,577
*YO5OHZ	99,680
*9A3RE	87,548

LOW POWER SINGLE OPERATOR ALL BAND

P4ØA (KK9A)	13,738,890
V25O (LY2CY)	7,051,968
CT7B (CT1ILT)	6,135,116
VQ5L (LA9HW)	5,411,050
NK4A (N4PN)	3,587,572
CN2BC	3,414,810
LR1F (LU5FD)	2,717,500
UA4FER	2,541,096
NV1N (N1UR)	2,362,512
4L2M	2,277,573
UA4LCQ/9	2,261,340
EX2X	2,181,292
E21EIC	2,072,637
F8AKS	1,958,426
LU2NI	1,786,512
UA9AL	1,615,221
ACØW	1,579,706
WD5K	1,522,092
RU3QW	1,494,640
YBØECT	1,389,852

28 MHz

LU5FII	1,169,412
PY2SBY	1,155,296
L44DX (LW1DTZ)	1,149,705
LU1FS	1,119,144
LU6HPF	1,091,076
XW3DT	604,304
LU6FOV	474,075
PU2WDX	466,884
PY2DY	459,660
LW1HDJ	445,712

21 MHz

ST2T (S57CQ)	4,594,725
LU5EML	3,639,916
WP3C	2,261,376
YB1BAD	1,747,724
YB2OBL	1,480,455
TI2VW	1,348,620
EK3SA	1,277,696
EC8ADU	1,250,480
BX3AC	1,095,468
RZ6FA	1,002,030

14 MHz

KC2NTB	1,421,410
4N1N (YT1BX)	1,401,366
UA9LAU	1,250,928
YP8A (YO8TU)	1,188,320
YU7ZZ	1,167,774
HG8L	1,012,350
LY9A	1,003,405
RA9AU	983,255
UR5HAC	966,456
YV5TX	966,120

7 MHz

T94DO	1,539,894
4D9D	791,224
OL6T (OK1DCF)	660,211
YT1LT	381,300
YU1AAV (YZ1ZV)	299,600
USØHZ	145,122
ZL3TE (W3SE)	115,542
M5W (MØMCX)	107,512
UAØFDX	104,199
CO6LPB	83,369

3.7 MHz

YT1AD (YU1AU)	1,268,064
7S7V	902,956
LY5A (LY2PAJ)	687,695
YU7AV	593,072
S53F	587,121
YT2A	484,516
T94LW	332,408
UU4JKY	316,240
OO7YX	312,872
OM7AB	306,308

1.8 MHz

YMØT (TA2RC)	486,846
VE3MGY	170,754
YO5OHZ	99,680
9A3RE	87,548
OK2HZ	68,211
OL6P (OK2WTM)	32,430
OK2BEN	30,081
UA3AAP	13,392
YT2W	7,524
US6IKF	5,519

TRIBANDER/SINGLE ELEMENT

ZX2B (PY2MNL)	A	8,174,796
P43E	A	5,996,124
ZPØR (ZP5AZL)	A	5,159,682
AY8A	A	4,641,329
KG6DX	A	3,754,025
HAØDU	A	3,509,818
NP2I	A	3,501,386
VK3TZ	A	2,402,001
K1LZ	A	2,303,616
*UA4LCQ/9	A	2,261,340
*EX2X	A	2,181,292
WH2V	A	2,027,822
UA9CMQ	A	2,007,490
AHØ/N2IU (JP1JFG)	A	2,006,851
OE5ØCWL (OE5CWL)	A	1,926,400
PY7ZY	A	1,923,849
DF3KV	A	1,895,234
VE3CR	A	1,710,786
*WD5K	A	1,522,092
OK1EP	A	1,492,487
UN5J	28	109,120
KG4WW	21	3,108,072
ZC4LI	21	1,572,480
*K8IA	21	231,660
OH3BU	14	496,218
*NV8N	14	424,258
*VE1OP	14	183,138
N2GC	7	27,753
*YY5YMA	3.7	189,406
GU4EON	3.7	116,427
*YT2W	1.8	7,524

ROOKIE

*CT7B (CT1ILT)	A	6,135,116
UN7MMM	A	1,718,147
UW1GZ	A	1,622,948
*SQ9JKW	A	1,166,790
*UR5MNZ	A	1,042,797
*EA2AYD	A	953,865
YB1AR	A	890,226
*HB9TQG	A	444,105
*SM6U (SM6YOU)	A	440,190
*DC7NF	A	402,215
*YY5EDG	28	289,432
*LU9DPM	28	34,917
*TI2VW	21	1,348,620
EA2BOV	21	717,990
*YY5RED	21	596,580
*UA9LAU	14	1,250,928
MØWKR	14	1,225,887
*TG9ANF	14	561,660
*M5W (MØMCX)	7	107,512
*YY5YMA	3.7	189,406
*SQ9JKS	3.7	121,011
*UA6BQD	1.8	5,076

QRP/p

TI5N (NØKE)	A	1,750,266
YT7TY	A	983,135
KA1LMR	A	860,662
UA3BL	A	825,920
OM7DX	A	771,579
TE2M (TI2KAC)	A	764,014
N8IE	A	636,157
VE6EX	A	514,885
RW3AI	A	399,990
OK1VBA	A	319,030
LU8EOT	28	93,060
W6QU (W8QZA)	28	12,772
NB1B	21	246,372
RA9UAD	21	145,340
RZ6HX	21	47,232
S57MSU	14	347,976
SO9L (SP9UML)	14	113,565
VA3VF	14	55,020
S54AA	7	200,872
YO7MDE	7	27,720
OL4W (OK1IF)	3.7	97,983
OM6TX	3.7	23,958
K3BU	1.8	11,115
ES6PZ	1.8	4,343

SINGLE OPERATOR ASSISTED

OE4A (OE1EMS)	A	10,628,416
RG9A (UA9AM)	A	7,808,760
LO2F (LU1FAM)	A	7,215,124
RL3A (UA3ASZ)	A	6,857,280
DL1IAO	A	5,687,130
YR7M (YO9GZU)	A	5,112,026
DJ5MW	A	5,089,020
WK4Y (W4MYA)	A	4,313,415
S53O	A	4,151,672
XE1KK	A	4,068,562
OH6NIO	A	3,836,794
KT4W (N4RV)	A	3,470,845
WO8CC (N8BJQ)	A	3,191,240
W1CU	A	3,053,738
N4ZZ	A	2,586,204
NA7XX (WØMU)	A	2,449,050
AD4EB	A	2,415,736
W1AJT/VE3	A	1,935,560
NN3Q	A	1,775,000
KW5DX (W5BL)	A	1,757,728
LQ5H (LU3HS)	28	1,396,278
KM4M (W3BP)	28	137,172
4N1SM	21	2,038,260
YT1BB	21	1,391,452
YO9HP	21	902,880
S57IIO	14	3,612,497
OE2S (OE2VEL)	14	3,550,606
DL3NED	14	2,959,440
DL2YL	14	1,569,792
KC1ME (K1JB)	14	1,055,235
OM7PY	7	95,700
9A1CCY (9A5TO)	7	90,828
OZ1ADL	3.7	752,130
KEØL	3.7	134,392
SN6C (SP6CZ)	1.8	431,624

MULTI-OP SINGLE TRANSMITTER

5B/AJ2O	28,966,272
CQ9K	21,831,270
LR2F	15,358,666
8Q7DV	13,375,950
OM8A	13,351,275
HI3CCP	13,318,272
PJ4Y	12,224,763
OM7M	12,209,162
ZY7C	11,288,664
LTØH	10,741,474
YT6A	10,424,128
GJ2A	9,366,844
LT2H	9,134,574
UAØAZA	8,865,162
TM7F	8,580,536
OL7R	8,497,635
9K2HN	8,161,560
TM4Z	8,123,104
TO1T	7,872,072
DL6RAI	7,378,068

MULTI-OP TWO TRANSMITTER

PJ2T	31,091,725
TS3A	30,460,277
ZW5B	27,390,828
KH7X	20,910,656
ES7ØQ	13,070,739
SQ6Z	9,508,504
VE7SV	9,248,472
WR3Z	8,320,680
VP9I	7,236,456
NX6T	5,335,588

MULTI-OP MULTI-TRANSMITTER

YW4M	32,163,974
OT5A	22,915,900
LZ9W	21,875,384
UP5G	21,245,070
NQ4I	15,111,810
LY7A	12,116,478
LX5A	11,350,185
ZL1V	10,881,579
RX4HZZ	9,325,820
T49C	8,297,978

*Denotes low power.

The P40A QTH. World low-power Single-Operator All Band honors went to P40A, op. John, KK9A.

Rafael, YY5RED, number one in Venezuela, Single Operator, 21 MHz, low power.

TROPHY WINNERS AND DONORS

WORLD: Stanley Cohen, W8QDQ Trophy. Won by: **D4B operated by Alexander Teimurazov, 4L5A.**
World Low Power: Caribbean Contesting Consortium Trophy. Won by: **John Bayne, P40A (KK9A).**
World QRP/p: Phil Krichbaum, NØKE Trophy. Won by: **TI5N operated by Phil Krichbaum, NØKE.**
USA: Atilano de Oms, PY5EG Trophy. Won by: **Robert Shohet, KQ2M.**
USA Zone 4: Society of Midwest Contesters Trophy. Won by: **George Fremin, K5TR.**
USA Low Power: Terry Zivney, N4TZ Trophy. Won by: **NK4A operated by Paul Newberry, Jr., N4PN.**
USA Zone 4 Low Power: Society of Midwest Contesters Trophy. Won by: **Bill Lippert, ACØW.**
CANADA Low Power: Contest Club Ontario Trophy. Won by: **Richard Brown, VA3YV.**
AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **J. R. Bullington, 5U7JB.**
EUROPE: Jim Hoffman, NF5A Trophy. Won by: **Bernd Och, DL6FBL.**
SOUTH AMERICA: Ron Moorefield, W8ILC Trophy. Won by: **9Y4W operated by Jaroslav Jamrich, OM3TZZ**
OCEANIA: Philip Frazier, K6ZM Memorial. Won by: **Joel Chalmers, KG6DX.**
JAPAN: The DX Family Foundation Trophy. Won by: **Hiroyuki Inaba, JS3CTQ.**
NORTH AMERICA QRP/p: Phil Krichbaum, NØKE Trophy. Won by: **Christopher Merchant, KA1LMR.**
USA QRP/p: Doug Zwiebel, KR2Q Trophy. Won by: **Daniel Shepherd, Sr., N8IE.**

SINGLE OPERATOR, SINGLE BAND

WORLD: Steve Merchant, K6AW Trophy. Won by: **ZD8Z operated by James Neiger, N6TJ.**
WORLD 28 MHz: Alan Dorhoffer, K2EEK Memorial Trophy. Won by: **Claudio Pons Estel, LU5FII.**
WORLD 7 MHz: William D. Johnson, KVØQ Trophy. Won by: **Dal Stanic, T94DO.**
USA 3.7 MHz: Lance Johnson Engineering Trophy. Won by: **Steven Sussman, W3BGN.**
USA 14 MHz Low Power: Boomer Contest Club Trophy. Won by: **Yuriy Rakushchynets, KC2NTB.**
USA 21 MHz: Bernie Welch, W8IMZ Memorial. Won by: **Robert Epstein, K8IA.**

MULTI-OPERATOR, SINGLE TRANSMITTER

USA: Steve Bolia, N8BJQ Trophy. Won by: **K3EST operated by Robert Cox, K3EST and Phil Allardice, KT3Y.**
USA Zone 4: Society of Midwest Contesters Trophy. Won by: **AJ9C operated by AJ9C, KE9I, N9LAH, KB9NSC, and KC9GMO.**
ASIA: W2MIG Memorial Trophy sponsored by Ed Campbell, NT4TT. Won by: **8Q7DV operated by UN4L, UN9LW, UA9CDC, UA9CDV and UA9CLB.**

MULTI-OPERATOR, TWO TRANSMITTER

WORLD: Doris Wong, AG1RL Trophy. Won by: **PJ2T operated by DF7ZS, DK3DM, DK9VZ, DL2SAX, DL8OBQ and WØCG.**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Gail Schieber, K2RED Trophy. Won by: **YW4M operated by YV2IF, YV4BOU, YV4GLD, YV4GME, YV5AMH, YV5EED, YV5IQJ, YV5KG and DL2GG/YV5.**
USA: Rick Dougherty, NQ4I Trophy. Won by: **NQ4I operated by NQ4I, K4BAI, K4PK, K4UJ, K5ZM, K9JS, KD4D, KE4UW, KN6RO, KT4ZB, N4OX, VE7ZO and WI4R.**

CONTEST EXPEDITION

WORLD: Kansas City DX Club Trophy. Won by: **5B/AJ2O operated by RA3AUU, RW3QC, and RW4WR.**

9A5TO, operating 9A1CCY following closely in second place. Jan, OZ1ADL, won 80 meters, with Jim, KEØL, in second. Zbigniew, SP6CZ, won the 160-meter category as SN6C.

Costa Rica took the top QRP spot this year. Phil, NØKE, operating as TI5N, took the number one spot with an almost two-to-one margin over second-place Bosko, YT7TY. Third and fourth place were hotly contested by Chris, KA1LMR, and Chermen, UA3BL. Stefan, OM7DX, rounded out the top five. Mariano, LU8EOT, was the top 10-meter op; Dennis, NB1B, was the winner on 15 meters; Uros, S57MSU, won 20 meters; Franc, S54AA, was the 40-meter champion; OL4W (Milan, OK1IF op) was again the winner on 80 meters; and Yuri, K3BU, took the 160-meter top QRP spot.

USA

Bob, KQ2M, again won the top SOAB USA spot. He was followed by Bill, K4XS, as WK4R in second and Ken, K4ZW, in third place. KC3R (Alex, LZ4AX) was fourth; KW7Y (Mitch, K7RL) was fifth; WPX veteran Fred, K3ZO, was sixth; and John, WE3C, took seventh. George, K5TR, was eighth and Steve, N2IC, took ninth place. The tenth spot went to low-power entrant Paul, N4PN, operating as NK4A.

Chuck, W5PR, was again the 10-meter champ, this time as KJ5Y, with WN1GIV (Bob, N4BP) in second place. NA4W's low-power entry from K4WI was third; Larry, KØRI, was fourth; and Dick, K9OM, was fifth with another low-power entry. On 15 meters Carol, N2MM, handily took first place. In second was Joe, W5ASP, operating NQ5K, followed by Jim, KØRH, and George, N2GM. Bob, K8IA, was fifth with a low-power entry. Twenty meters saw a very tight race between Dan, W7WA, and John, N3HBX, with Dan narrowly winning. WZ1R (Chas, N1RR) was third, low-power KC2NTB was fourth, and Ken, K6HNZ, wrapped it up in fifth place. On 40 meters Dave, K8GVK, was the winner,

with Lewis, WW4LL, second and Mike, N2GC, third. Paul, KU6T, was fourth and Tom, WA6WPG was fifth, both low power. The 80-meter winner was Steve, W3BGN, with a commanding lead over second-place KG4NEP. Leo, AA4MM, was third, with Mike, KK9V, fourth and low-power W9LYN (Bill) fifth. On 160 meters Manuel, W2MF, was the winner, and Randy, K8OQL, was second.

NK4A (Paul, N4PN) claimed the US SOAB low-power title; followed by Ed, N1UR, operating NV1N in second; with Bill, ACØW, third; Tom, WD5K, in fourth; and fifth place went to Ed, NT4TT. Courtney, K4WI, was the 10-meter winner operating NA4W, with Dick, K9OM, second and Vlad, KM6Z, third. Fifteen meters was once again won by Bob, K8IA, with Kent, KK1H, second, and Don, W7UPF, third. Yuriy, KC2NTB, showed up with a big score to take the top 20-meter low-power entry, followed by Ryan, NV8N, and Ron, N4MO. Forty meters was won by Paul, KU6T, with Tom, WA6WPG, second and Eric, K9GY, third as K4AF. Bill, W9LYN, won the 80-meter award.

Krassy, K1LZ, easily won the US Tribander/Single Element category; followed by low-power WD5K in second; Tom, K3TW, third; Ben, N3UM, in fourth place; and Ron, WA1JMP, fifth. WD5K and Doug, WB8TLI, were the top two low-power winners in the T/S category, followed by Steve, W9DX, and Ben, WB2RHM. Andrew, KC2GOW, won the Rookie top spot, with Scott, NE1RD, in second place and Bob, W4TTX, in third.

The top Single Op Assisted honors went to a crowd of WPX regulars, with Bob, W4MYA, operating as WK4Y in first place. Second place went to Jack, N4RV,, operating KT4W and WPX Director Emeritus Steve, N8BJQ took third. Jon, W1CU, was fourth and Don, N4ZZ, wrapped it up in fifth place. W3BP had the top 10-meter score operating KM4M, as did Joe, K1JB, as KC1ME on 15 meters and Jim, KEØL, on 160.

The USA QRP winners were Chris, KA1LMR, in first place; Dan, N8IE, second; and Chas, K3WW, in third. Single-band winners were Bill, W8QZA, as W6QU on 10 meters and Yuri, K3BU, on 160.

Multi-Ops

The Multi-Single category and a new continental record was won this year by 5B/AJ2O, with a big score turned in by RA3AUU, RW3QC, and RW4WR. Moving up to second place was CQ9K, operated by ten ops from CT3. Third position was won by LR2F, manned by LU1FZR, LU2FA, LU5FC, and LW7DX. 8Q7DV was fourth with UA9s CDC, CDV, CLB, UN4L, and UN9LW. OM8A scored fifth with eight ops from OM, with HI3CCP in sixth place, PJ4Y seventh, OM7M eighth, ZY7C again ninth, and LTØH finishing up in the tenth spot.

In 2005 Bob, K3EST, and Phil, KT3Y, won the top USA multi-single award as K3EST with a decisive win over second-place NI1N, operated by NI1N, WM3T, and KC9LC. Third place was claimed by AJ9C, staffed by AJ9C, KE9I, N9LAH, KB9NSC, and KC9GMO. KØDU moved up to fourth place

this time, and in fifth place was KX7M (KX7M, W6NV, and N6KJ.)

In the popular Multi-Two category, PJ2T set new world and continental records and was the winner, operated by DF7ZS, DK3DM, DK9VZ, DL2SAX, DL8OBQ, and WØCG. TS3A (4N1EA, S56A, YT1AD, and YZ1BX) was right behind them with a continental record, and ZW5B was third. KH7X (KH6ND, KH7U, and AH6OZ) was in fourth place with a new continental record, and ES70Q took fifth place.

The US Multi-Two winner was WR3Z, operated by WR3Z, NH7C, WQ2M, and N3OC. Second place honors went to NX6T and ops K6AM, W6YI, N6KI, and NN6X. WX5S (@W6YX) took third with a big crowd of ops, NG3U was fourth, and AG1C fifth.

The top Multi-Multi score was earned by YW4M (YV2IF, YV4BOU, YV4GLD, YV4GME, YV5AMH, YV5EED, YV5IQJ, YV5KG, and DL2GG/YV5. Second place went to OT5A with 28 operators. The third spot went to LZ9W, UP5G was fourth, and US-based NQ4I rounded out the top five.

In the US, NQ4I took first-place Multi-Multi, operated by 13 fine ops. Second place went to NR6O, operated by the usual suspects, followed by the 20-operator team at KT9M and NE1C in fifth place.

The Rest of the Story

Most logs were sent in Cabrillo format, which is the default requirement. We continue to refine our log preparation instructions on the WPX contest website (http://www.cqwpx.com) so contestants will not have difficulties submitting their logs. Please do not rely on your logging program to get the Cabrillo header filled out correctly, especially if you are entering one of the categories that requires the addition of a Category Overlay line in the header. If you make any changes to your Cabrillo file, please use a simple text editor, not a word processor. See the 2006 rules or the website for more information.

Special thanks go to the many operators who travel to remote locations all over the world so the rest of us have interesting and exciting prefixes to work. Also, we thank the many operators who arrange for special prefixes solely for use in this contest.

Thanks to WT4I for his log-checking software, and to the members of the CQWW Contest Committee for their help in handling logs from their respective countries. Thanks as well to Trey, N5KO, and his robots; they are a huge help in the log-checking process.

We do check serial numbers. If we receive a log without sent or received serial numbers it will be reclassified a checklog. If you encounter problems with serial numbers in your log, please take up the matter with your logging program author. With close to 5000 logs to process each year it's impossible for us to fix everyone's log.

Biggest thanks go to Steve Bolia, N8BJQ. He has been tireless and is always ready to step in to help in the process.

The 2006 WPX SSB Contest will be held on March 25–26. Please plan to participate. Starting with the 2006 contests we have eliminated the Band Restricted category due to lack of participation. Complete rules are elsewhere in this issue of *CQ* and will be posted on both the CQ and the WPX websites. Logs are requested to be submitted by e-mail in Cabrillo format. Send SSB logs to <ssb@cqwpx.com>.

See you in the 2006 contests.

73, Steve, K6AW

USA TOP SCORES

USA TOP SCORES SINGLE OPERATOR ALL BAND

KQ2M	9,089,410
WK4R	8,883,951
K4ZW	7,107,828
KC3R (LZ4AX)	6,758,540
KW7Y (K7RL)	5,751,270
K3ZO	5,400,216
WE3C	5,155,634
K5TR	4,645,318
N2IC	4,610,205
*NK4A (N4PN)	3,587,572
W5WMU	3,448,956
KI5DR	3,105,008
NK7U (N6MJ)	2,995,906
KU1CW	2,834,100
KN7NV (KL2A)	2,721,482
*NV1N (N1UR)	2,362,512
K1LZ	2,303,616
W8MJ	2,235,806
N3KS	2,034,815
AD4TR	1,904,448

28 MHz

KJ5Y (W5PR)	466,264
WN1GIV (N4BP)	166,050
*NA4W (K4WI)	138,000
KØRI	35,175
*K9OM	29,205

21 MHz

N2MM	963,569
NQ5K (W5ASP)	672,035
KØRH	332,846
N2GM	250,784
*K8IA	231,660
W6AFA	201,196
*KK1H	162,773
*W7UPF	90,356
*N8OL	87,242
N6QQ	87,096

14 MHz

W7WA	3,797,420
N3HBX	3,623,628
WZ1R (N1RR)	3,117,244
*KC2NTB	1,421,410
K6HNZ	583,528
*NV8N	424,258
*N4MO	400,680
WA7AR (W7FP)	272,350
*KZ5OH	151,305
W7QN	92,000

7 MHz

K8GVK	39,795
WW4LL	28,000
N2GC	27,753
*KU6T	17,136
*WA6WPG	12,760

3.7 MHz

W3BGN	785,312
KG4NEP	485,688
AA4MM	159,885
KK9V	44,800
*W9LYN	17,512

1.8 MHz

W2MF	39,760
K8OQL	2,010

LOW POWER SINGLE OPERATOR ALL BAND

NK4A (N4PN)	3,587,572
NV1N (N1UR)	2,362,512
ACØW	1,579,706
WD5K	1,522,092
NT4TT	1,057,920
N5DO	926,287
WB8TLI	920,125
K9QVB	622,710
WA8WV	595,315
N4NX	586,254

28 MHz

NA4W (K4WI)	138,000
K9OM	29,205
KM6Z	9,990
W4JIK	7,546
KD5TXL	6,721

21 MHz

K8IA	231,660
KK1H	162,773
W7UPF	90,356
N8OL	87,242
NP4IW/AB6	55,583

14 MHz

KC2NTB	1,421,410
NV8N	424,258
N4MO	400,680
KZ5OH	151,305
N8ILU	86,955

7 MHz

KU6T	17,136
WA6WPG	12,760
K4AF (K9GY)	12,240
K7AWB	7,020

3.7 MHz

W9LYN	17,512

TRIBANDER/SINGLE ELEMENT

K1LZ	A	2,303,616
*WD5K	A	1,522,092
K3TW	A	1,420,100
N3UM	A	1,228,596
WA1JMP	A	1,085,596
*WB8TLI	A	920,125
NJ2F	A	541,782
*W9DX	A	506,484
W1BYH	A	485,080
*WB2RHM	A	427,652
*K8IA	21	231,660
*W7UPF	21	90,356
*NV8N	14	424,258
W7QN	14	92,000
*N8ILU	14	86,955
N2GC	7	27,753

ROOKIE

*KC2GOW	A	105,789
*NE1RD	A	99,882
*W4TTX	A	93,080
*KI4EXW	A	56,420
*KV6O	A	51,054
*KD8ACG	A	37,920
KC2MDQ	A	34,888
*NF3R	A	31,473
*KC2KTZ	A	14,744
KC5DJI	A	13,345

QRP/p

KA1LMR	A	860,662
N8IE	A	636,157
K3WW	A	299,200
KR1ST	A	178,772
NX9T	A	177,895
W6QU (W8QZA)	28	12,772
K3BU	1.8	11,115

SINGLE OPERATOR ASSISTED

WK4Y (W4MYA)	A	4,313,415
KT4W (N4RV)	A	3,470,845
WO8CC (N8BJQ)	A	3,191,240
W1CU	A	3,053,738
N4ZZ	A	2,586,204
NA7XX (WØMU)	A	2,449,050
AD4EB	A	2,415,736
NN3Q	A	1,775,000
KW5DX (W5BL)	A	1,757,728
AB2E	A	1,593,984
KM4M (W3BP)	28	137,172
N5MT	28	33,912
KC1ME (K1JB)	14	1,055,235
N2UN	14	88,920
KEØL	3.7	134,392

MULTI-OP SINGLE TRANSMITTER

K3EST	7,138,096
NI1N	4,308,405
AJ9C	4,149,184
KØDU	3,575,311
KX7M	2,680,210
NN5Z	1,894,008
AJ5DX	1,696,065
WG7X	1,131,154
W5LCC	949,905
K4VV	735,546

MULTI-OP TWO TRANSMITTER

WR3Z	8,320,680
NX6T	5,335,588
WX5S	4,954,104
NG3U	3,566,914
AG1C	595,525

MULTI-OP MULTI-TRANSMITTER

NQ4I	15,111,810
NR6O	7,766,641
KT9M	4,109,525
NE1C	3,642,108
WX3B	2,548,660

**Denotes low power.*

QRM

Good contest. A bit slow on the Saturday but improved on Sunday. Force 12C3SS beam worked well and the dipoles homemade with my 50 watts from the FT1000MPMK5.....**2EØATY.** With poor band opening to NA, this is my best performance so far. See you all again next year..... **4F1MEU.** Was great to hear so many stations on from 8P. Heard or worked 8P6ET, 8P6EX, 8P6GE, 8P9AM, 8P6QA, and 8P6RC. That should have kept everybody happy with prefixes from Barbados. Pity about the poor propagation across the Atlantic....**8P2K.** I wanted to contact many EU stations; however, condx didn't allowed that. Expect me next year .....**AHØ/N2IU.** After contest I always said never again 40m single. Not too many people, but made my best forever result from EA8! Thanks to everybody and apologize to those I did not hear, tough QRM....**AN8AH.** For me this is the best contest. This year only worked on 10 meters but the propagation is not good for work with only tribander TA33m antenna and only 500 watts with Heathkit SB200. Best regards to all contesters.... **CE4PBB.** Condx were great! 40m band was open to Asia at 3 in the afternoon....**CN2R.** First time SO2R. Tnx to CT1BOH for lending me his WXØB box, and CT1EEB for lending me his TS2000. This will be my last year as Rookie..... **CT7B.** It's great to claim world record each year starting with 2002, hi. I hope that will be confirmed. My congratulations to Jim, ZD8Z, and Jim, CN2R, for fantastic scores. I think this year SOAB, SOSB 7 and 21 is break. I don't know about another band....**D4B.**

Nice contest with five new ones for DXCC.... **DL2DVL.** This was my first WPX contest this year and it was a fine contest! Okay, two nights without much sleep, but the big activity was just great. It was a bit difficult with 100W to make big QSO

rates, because my beam (TH6DXX) didn't work fine, as usual....**DM2SR.** Thanks to Dej, E21YDP, for support station and thanks to all for QSOs..... **E21EIC.** Spent some time on top of a cherry picker checking the lengths of the elements on my X-7 on Saturday. They were way off and not sure how it happened! Had a good time nonethe less.....**EI4CF**. Condx were very variable; 15m was not open Saturday with North America; better Sunday. 10m nearly dead. As usual many good DX on 40m....**F6FTB.**

Not a very serious effort for this one No 10m and no 15m NA opening. Lots of KW stations fighting it out on 20 and below. But still good fun as long as you don't get too frustrated!....**GØMTN.** 10m was dead, but 40m was three deep on every frequency!....**G6CSY.** Part time effort, great fun. Blew out the winter cobwebs!....**GM4AFF.** First big single-op contest from home shack after contesting as multi-op of VE6AO. Was a really nice contest, even as a little pistol! Second day better conds. Thanks for this great contest.....**HB9TQG.** Just a small entry into contesting and to give away a few points to those who can hear me. Nice to work some DX using my vertical dummy load outside that does not really deserve to be called an antenna :). Hope to have a better setup next time....**HSØZEN.** It was tough for the station without beam antenna during low sunspot period. I was using a trapped vertical antenna that was installed on the 14-stories building. But it was fun. Thanks a lot.....**JJ1MZH.** This was my first WPX contest. It was a lot of fun. I'm a rookie at contesting yet I am hooked. I had very limited time on the air over

CQ WW WPX SSB CONTEST
ALL-TIME RECORDS

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	SO2R('05)	756,105	399
3.5	EA8/OH1MA('97)	4,317,284	562
7.0	CN2R('05)	14,724,696	931
14	EA8AH('97)	11,142,198	981
21	ZD8Z('05)	17,129,112	1196
28	D44AC('02)	15,707,401	1123
AB	D4B('05)	26,871,482	1271
QRP/p	HC8A('94)	7,520,562	714

Multi-Operator Single Transmitter

D44TD('02)		33,443,856	1332

Multi-Operator Two Transmitter

PJ2T('05)		31,091,725	1225

Multi-Operator Multi-Transmitter

HC8N ('03)		60,703,452	1476

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95)	327,712	308
3.5	WE3C('95)	1,519,300	475
7.0	KC7EM('95)	1,950,228	495
14	KK9A('00)	6,621,446	962
21	KX8R('00)	7,556,250	930
28	NY4A('00)	6,006,573	877
AB	KQ2M('00)	11,875,240	1066
QRPp	KR2Q('00)	2,688,158	649

Multi-Operator Single Transmitter

KM3T('99)		14,091,468	1077

Multi-Operator Two Transmitter

KM4M('04)		13,025,033	1171

Multi-Operator Multi-Transmitter

KM3T('00)		29,338,460	1355

CLUB RECORD

Contest Club Finland ('00) 250,320,141

QRPp RECORD

HC8A('94) 7,520,562

WPX (Prefix) RECORD

OTØA('00) 1528

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	EA8/OH1MA('99)	404,976	208
3.5	EA8/OH1MA('97)	4,317,284	562
7.0	CN2R('05)	14,724,696	931
14	EA8AH('97)	11,142,198	981
21	ZD8Z('05)	17,129,112	1196
28	D44AC('02)	15,707,401	1123
AB	D4B('05)	26,871,482	1271

ASIA

1.8	*YMØT('05)	486,846	222
3.5	UA9CSS('94)	1,074,780	315
7.0	H24LP('87)	5,348,975	503
14	H2A('91)	6,297,464	758
21	7L1GVE('92)	6,848,136	838
28	H22H('00)	9,092,146	931
AB	JY9NX('01)	15,463,485	1017

EUROPE

1.8	SO2R('05)	756,105	399
3.5	SO2R('04)	2,543,708	643
7.0	9A9A('99)	4,624,188	724
14	DJ7AA('00)	7,955,224	1052
21	CQ1BOP('00)	6,989,997	1029
28	GM7V('00)	8,305,756	982
AB	OK1RI('01)	10,844,592	1034

NORTH AMERICA

1.8	VA1A('99)	535,225	271
3.5	VE1BY('00)	2,226,300	492
7.0	TI4CF('05)	8,057,479	751
14	KP2A('95)	7,088,976	912
21	WP3R('98)	10,167,632	986
28	KP2A('00)	11,385,710	1046
AB	8P9AM('05)	18,516,316	1183

OCEANIA

1.8	AH6PR('99)	18,963	49
3.5	WH7Z('03)	1,208,900	308
7.0	WH7Z('99)	4,582,773	507
14	KH6ND('03)	6,493,727	887
21	AH7DX('00)	7,645,990	890
28	TXØDX('00)	12,049,422	847
AB	KH6ND('01)	15,498,798	1029

SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	P4ØA('96)	1,715,076	426
7.0	ZX9A('97)	10,787,128	814
14	PYØFM('95)	9,660,432	939
21	ZW5B('95)	14,095,142	1054
28	ZX5J('99)	14,405,820	1095
AB	HC8A('01)	25,180,199	1199

MULTI-OPERATOR SINGLE TRANSMITTER

AF	D44TD('02)	33,443,856	1332
AS	5B/AJ2O('05)	28,966,272	1252
EU	9A7A('02)	19,034,950	1306
NA	VP2EC('92)	24,409,580	1115
OC	T33RD('99)	17,778,372	998
SA	HC8A('93)	32,502,677	1107

MULTI-OPERATOR TWO TRANSMITTER

AF	TS3A('05)	30,460,277	1139
AS	A61AJ('04)	30,157,650	1255
EU	RU1A('04)	16,054,404	1257
NA	V47KP('03)	15,958,488	1092
OC	KH7X('05)	20,910,656	1066
SA	PJ2T('05)	31,091,725	1225

MULTI-OPERATOR MULTI-TRANSMITTER

AF	CN8WW('99)	55,151,562	1334
AS	P3A('00)	53,554,592	1456
EU	9AY2K('00)	42,477,343	1493
NA	WL7E('00)	42,013,215	1395
OC	KH7R('02)	32,806,032	1304
SA	HC8N('03)	60,703,452	1476

the weekend. What time I did have was lots of fun. I can't wait until the CW contest.....**K1USC.** First time in SSB WPX. Running at low end of low power (Argonaut V at 18–20W) to an 88-ft. doublet up 20 feet....**K2EKM.** Gotta love the WPX contest! My favorite.... **K2HVE.** God can we please have an SSB DX weekend without a storm?.... **K3MD.** A few hours of hilarious fun!....**K6OWL.** Thought I'd make it a challenge this time and do the contest with 100 watts! I did better than I ever dreamed I could on low power!....**K6TIM.** Had lots of fun. Great to contact so many countries when the bands seem down. Should be even better next year!.... **KB8UUZ.** What a great way to analyze the performance of your new station.....**KC8YSW.** I had a very fun time even though I did not make many contacts. I especially enjoyed the late-night work on 40m and 80m. I even made my first contact ever on 80! All my contacts were very nice, encouraging, patient, and helpful.....**KD7EJC.** Easter holiday and poor band conditions. 10 and 15 were totally dead. Afternoon on Saturday and Sunday was the best on 20 meters. Did manage a few contacts on 40. Superior radio, inferior antennas. Better shape next year!.... **KL8DX.** I can sure tell I'm not located in the propagation capital of the world. I doubt I heard even 300 stations total all weekend, let alone thousands, but to the big gun EU. Stations on 40 who CQed without responding to anyone, u were 59 MT.....**KS7T.** First contest with my new monster antenna. Technically I am a US Rookie, but realistically I have been licensed for 46+ years in other countries....**KY6LA.** This was my first SOAB operation in this contest. CU you next year with better antennas and also I will be able to run SO2R. 73s and good DX from new contest station in Luxembourg....**LX7I.** First time in CQ WPX contest and had a great time. Life would have been difficult without using SD, so many thanks to EI5DI for its production. Many thanks also to the willing helpers working in the background finalizing results—much appreciated....**MØOIC.** Hard work with 5W but pleased to get ZD8, 8Q7, ST2, and VP9. Really pleased that so many operators pull out the weak ones! Great contest.....**M3RCV.**

Conditions were better on the second day. Worked some good multipliers from Africa on 15m. Did find it difficult on the lower bands, of course, with QRP. But all in all a fantastic contest. Finished just after 1900Z on the second day to go to sleep.....**MM3AWD.** Excellent contest. Conditions to NA were better than expected; some super strong signals on the band. Will be back next year. Thanks to all who called.....**MU2Z.** Now that was a fun contest. Even though solar flux wasn't very high I was able to consistantly search & pounce a steady stream of stations. If it wasn't a holiday weekend, I likely would have been able to do a personal best..... **N3GNW.** Fairly reasonable conditions, although there was fairly intense QSB into Europe on the second day. I might have scored higher if it had not taken me all of the first 8 hours of the contest before discovering that my anteanna was pointed 180 degrees away....**N3HBX.** Fourth time in SSB WPX. Before I've taken several hours off, to go out in the evening or enjoy spring weather (I'm more serious about CW contests). This year weather was terrible. Nothing else to do, so put in 26 hrs and got personal best in QSO points.... **N3UM.** Tough condx for those of us reduced to dipoles!....**N4GG.** Excellent condx for my marginal equipment....**N6QZS.** This is the one and only time of the year when I wish I had a weird callsign.....**N7ZG.** Great conditions on 15–80 meters. 10 just never opened up. Thanks to all the SA and Canadians for being there. 73 es go Mad River! ....**N8IE.** First time I tried contesting was earlier this year for the ARRL SSB contest. This is my second attempt. Had a lot of fun and hope to come back next year.....**N8ILU.**

There was no real strategy involved; I just tuned up the band and called anything I could hear. Only made about 20 QSOs running. I was loud enough to work almost anything I heard, but not loud enough to hold a frequency and run.....**NB1B.** Very limited time to operate this year (less than 12 hours). Fair conditions and activity: but generally tough going from here in the black hole with 3 watts.....**NDØC.** My employer decided that WPX weekend would be a great time to move five broadcast stations in Birmingham, AL. I was only able to operate a couple of hours. Thanks to N4JF for letting me use his station.....**NF4A.** Thanks to Charlie, NF4A, for getting permission from NK4A to use his call again. The numbers didn't look very good, but I thought condx were outstanding except for the bad storms all over the place.....**NK4A.** My second low power test. Had a ball and still learning. Had problems getting into some areas because low power, but fun no less. Good to work KG6DX again. My thanks to KØUK for opening his home again for me to compete.....**NT4TT.** Nice contest. Although I took part as SOAB I mainly worked on 20m (I had some antenna problems on 15m and no antenna for bands under 20m). Participation as SOSB 20m would have been better. See you next year or in next contest!....**OE8WOQ.** Balancing the weekend between the family, contesting, and DXing. The linear made the radio room like a sauna, as the closed door that was needed to keep the children out kept hot air inside. Next time I apparently need to do QRP....**OH3BU.**

Absolute band blackout both Saturday and Sunday during afternoon. Anyhow it was a nice weekend and might have been even better if pipelines to US and EU were open. Great contest. First time with IC-756PROII voice memories. What a voice saver! ....**P29NB.** My birthday occured during the contest. What a great present two years in a row!....**P4ØA.** Like always, breaking my own best mark was the mission, and I was fine on that. Never 2000 QSOs before in a single band situation. Thanks all of you, my friends, and congratulations to YLs. More than ten YL's in my log!.... **PY2NY.** My father helped me to make few contacts. I am 12 years old. Thank you for contest and see you again.... **SP4PBI.** Participating for the second time, now with Amitron ALS-500M amplifier. Never got more than 250W using 12V car batteries. Great fun. Thanks all.....**TF3AM.** The lack of sunspots shows but still some north-south on 10. 76% of QSOS NA as to be expected at this point of cycle. Thanks to TI5KD for use of the fb station again.... **TI5N.** If I told you that you were just above my noise level during the contest don't be concerned about your signal. It meant that you were 20/9! On 160m it was the QRN contest not the WPX contest this year! Still lots of fun though, in a sadistic type of way.... **VE3MGY.** A huge hailstorm with a lightning strike within 500m put me off the air for several hours. Plenty of fun in this contest as usual. The tribander was only up 8.0m so I am very please with the results. Too much time not in the chair but yapping with my host ....**VK3TZ.**

Pile-ups were big and glad to work all the stations that needed VQ9 in their log.....**VQ9LA.** Operated without indicator light working on rotator, so at night I had to open a window in the next room and shine a flashlight up at the beam to see where it was headed.... **W1CU.** At this stage of the cycle, QRP on 10 meters was still pretty exciting. 77% of my 74 Qs were in South America. Many thanks to all the Argentine stations with their many prefixes!.... **W6QU.** My biggest thrill was working 5U7B (Niger) with 5 watts!....**W8VE.** Don't know why, but first time to participate in WPX SSB contest. Will certainly keep this event on my contest calendar for next year.... **WA7LNW.** Could not work full 36 hrs due to other commitments, but I had a lot of fun anyway. Was happy to see soooo many familiar calls. Memorable moment was that my very last QSO was an OD5 in Lebanon on 40m....**WB2QLP.** The best part is working old friends.... **XE1KK.** We had six mortars incoming around 1300Z on 27 March 2005. Wish I could get a few extra multipliers during that time. Worked 1020 QSOs, most operating at one time. I am worn out! There are several of us American hams here in Iraq who are gonna work a multi....**YI9QWO.** This was so much fun! I ended up operating without interruptions and put in 20 hours. The effort resulted in two things—a personal-best score and loss of my voice. Thank goodness for my prerecorded messages in Writelog! 73 de Korey—Camp Cooke, Iraq....**YI9VCQ.** I am 13 years old and this is first my WPX contest.....**YO7MDE.** A great contest. Bands not too good, but I had a lot of fun....**ZS6RAE.**

(Continued on page 105)

CONTINENTAL LEADERS

AFRICA

1.8	CT9M	148,577
3.5	No Entry	
7	CN2R	14,724,696
14	EA8EW	8,719,848
21	ZD8Z	17,129,112
28	*AM8AKN	75,485
AB	D4B	26,871,482

ASIA

1.8	YMØT	486,846
3.5	RX9UKF	77,056
7	RZØSR	283,290
14	4L8A	6,279,069
21	ZC4LI	1,572,480
28	5B/MØXAA	748,500
AB	RK9CWW	6,197,370

EUROPE

1.8	SO2R	756,105
3.5	SN3A	2,369,664
7	UU7J	3,389,358
14	CT8T	6,703,695
21	DL3TD	2,137,194
28	*S57S	78,600
AB	DL6FBL	9,750,351

NORTH AMERICA

1.8	*VE3MGY	170,754
3.5	W3BGN	785,312
7	TI4CF	8,057,479
14	W7WA	3,797,420
21	KP4WW	4,934,388
28	V31LZ	779,943
AB	8P9AM	18,516,316

OCEANIA

1.8	No Entry	
3.5	*YC2MXV	130
7	KH6FKG	936,900
14	*YB2DX	464,091
21	*YB1BAD	1,747,724
28	*V73KJ	46,822
AB	KG6DX	3,754,025

SOUTH AMERICA

1.8	No Entry	
3.5	*YY5YMA	189,406
7	4M5DX	3,789,672
14	PY2NY	4,922,663
21	PY1KN	7,503,520
28	LU1HF	4,434,977
AB	9Y4W	18,548,160

MULTI-OPERATOR SINGLE TRANSMITTER

AF	CQ9K	21,831,270
AS	5B/AJ2O	28,966,272
EU	OM8A	13,351,275
NA	HI3CCP	13,318,272
OC	YB2ZDR	1,828,190
SA	LR2F	15,358,666

MULTI-OPERATOR TWO TRANSMITTER

AF	TS3A	30,460,277
AS	RY9C	2,947,466
EU	ES7ØQ	13,070,739
NA	VE7SV	9,248,472
OC	KH7X	20,910,656
SA	PJ2T	31,091,725

MULTI-OPERATOR MULTI-TRANSMITTER

AF	No Entry	
AS	UP5G	21,245,070
EU	OT5A	22,915,900
NA	NQ4I	15,111,810
OC	ZL1V	10,881,579
SA	YW4M	32,163,974

**Denotes Low Power*

Announcing:

2006 Nominations Open for the *CQ* Amateur Radio Hall of Fame

Amateur radio operators have been responsible for many advances in communications technology, and entire industries have been built on the foundation of amateur radio experimentation and activity. In an effort to recognize outstanding amateurs and their achievements, and help the public appreciate the far-reaching and long-standing value of amateur radio in our society, we have established the *CQ* Amateur Radio Hall of Fame. Nominations for the 2006 "class" are now open. Members of the 2005 "class" were announced last May and appeared in the July issue of *CQ*.

The *CQ* Amateur Radio Hall of Fame honors those whose technical or other accomplishments have helped propel amateur radio forward, or whose achievements in other areas of life have helped improve ham radio's reputation simply through association. Nominees for the *CQ* Amateur Radio Hall of Fame will be judged on the basis of qualifying in one of two broad areas: those individuals—whether licensed amateurs or not—who have made significant contributions to the amateur radio hobby; and those radio amateurs who have made significant contributions to society in general. Nominees must have made *significant* contributions of nationwide or worldwide impact.

Nomination Period Closes March 31

Between now and March 31, 2006, we will be accepting nominations for the 2006 "class" of the Amateur Radio Hall of Fame. Nominations received after that date will be considered for future selection. You may either use the form on the following page or on our website, or simply write us a letter stating your candidate's name, where to contact him/her if still living, for which category you are nominating him/her, and a brief one- to two-paragraph description of this person's accomplishments. Please include your name and contact information as well. E-mail to <hall-of-fame@cq-amateur-radio.com> or mail to *CQ* Amateur Radio Hall of Fame, 25 Newbridge Rd., Hicksville, NY 11801. If you feel someone has earned this recognition, please submit a nomination. Please *don't* assume that someone else will nominate the person you may have in mind.

We'll be making up our own candidate list at the same time, and will announce this year's selections at the Dayton Hamvention in May 2006. Please help us recognize these "ham radio heroes" whose contributions have helped shape our hobby, our nation, or our world.

(Official nomination form is on the next page.)

CQ DX and Contest Halls of Fame

Nominations are also open for the **CQ DX Hall of Fame** and the **CQ Contest Hall of Fame**, which recognize those amateurs who have made major contributions to DXing and contesting, respectively. The activities and accomplishments that qualify one for membership in these elite groups involve considerable personal sacrifice and can usually be described by the phrase "above and beyond the call of duty."

Nominations for the Contest and DX Halls of Fame are made by **contesting or DX clubs or national organizations,** and must be submitted by **March 1** of each year to be considered. A maximum of two (2) people may be inducted into each hall of fame each year. Nominations for the CQ Contest and DX Halls of Fame should be directed to Bob Cox, K3EST, c/o CQ Communications Inc., 25 Newbridge Rd., Hicksville, NY 11801; or via e-mail to <k3est@cqww.com>.

CQ Amateur Radio Hall of Fame Nomination Form

The purpose of the CQ Amateur Radio Hall of Fame is to recognize individuals who have made significant contributions to the amateur radio hobby, and/or radio amateurs who have made significant contributions to society at large.

Name of Person Nominated:_____

Callsign (if licensed amateur/if multiple callsigns, list most recent): _____

If your nominee is still living and you know how to contact him/her, please supply the following contact information:

Mailing address: _____

City: _____ State/Prov. _____ Zip/Postal Code: _____

Country: _____

Phone: _____ Fax: _____

E-mail address: _____ @ _____

Please write a brief (one to two paragraph) description of this person's accomplishments/achievements and why you feel he/she should be elected to the CQ Amateur Radio Hall of Fame (if you need more room please attach a separate piece of paper):

Nominator Information

(This is only for the purpose of contacting you in case of questions, and will not be published.):

Your name: _____ Callsign: _____

Mailing address: _____

City: _____ State/Prov. _____ Zip/Postal Code: _____

Country: _____ Phone: _____ Fax: _____

E-mail address: _____ @ _____

The Return of a Legend

LDG Electronics Introduces the **NEW** Z-11Pro

The Return of a Legend. Our original portable Z-11 was one of LDG's most popular tuners, accompanying adventurous hams to their backyards, or to the ends of the earth. Now meet the Z-11Pro, everything you always wanted in a small, portable tuner designed from the ground up for battery operation.

Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 to 6 meters.

LDG ELECTRONICS **2 YEAR WARRANTY**

Full auto mode tunes with SSB. Just speak into the mic and it tunes! The Z-11Pro uses LDG's state-of-the-art processor-controlled Switched-L tuning network. It will match dipoles, verticals, inverted-Vees or virtually any coax-fed antenna. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line.

Specifications:

- 0.1 to 125 watt power range (SSB and CW), 100W on 6 meters.
- Tuning time: 0.1 to 6 seconds full tune, 0.1 seconds memory tune.
- 1.8 to 54.0 MHz coverage. Built-in frequency sensor.
- Optional interfaces for Icom, Alinco, Kenwood and Yaesu available.
- Power requirements: 8 to 16 volts DC at 300 mA maximum, 25 µA standby current.
- Tuner may be battery powered via a user-supplied internal 6 or 8-cell AA or AAA pack. Batteries last up to 4 years.

List price $179.

The Z-11Pro is waiting for your next portable adventure. Where will you go next... ?

FREE Z-11Pro Interface cable for Icom or Yaesu with Z-11Pro Purchase

Visit our Web site for the mail-in rebate form:

www.ldgelectronics.com

Offer extended to December 31, 2005

All LDG Electronics' Automatic Antenna Tuners Cover HF and 6 Meters!

The 200 Watt AT-200Pro

Designed for today's high-powered transceivers.

The AT-200Pro features LDG Electronics' new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 to 30 MHz, and 100 watts on 6 meters.

Rugged and easy-to-read LED bar graphs show power and SWR, and a function key on the front panel allows you to access data such as mode and status. Built-in two position antenna switch. Memories are provided for up to four different antennas on each connector.

The AT-200Pro is the perfect match for high power Kenwood, Yaesu, Ten-Tec or Icom radios.

LDG ELECTRONICS **2 YEAR WARRANTY**

List price $249.

The Low-Cost Z-100

The Z-100 is the definitive low cost automatic antenna tuner!

Designed from the ground up to provide the 100 watt power handling you asked for, in a small, lightweight package, perfect for portable as well as sitting on your desk in your shack!

The Z-100 will tune with 0.1 to 125 watts (50 watts on 6 meters), making it an excellent choice for almost any radio or operating style. Backpackers and QRP operators will appreciate the latching relays. When the tuner is not tuning, it draws nearly zero amps. You can even remove DC power from the tuner once you have found a match.

The Z-100 features 200 fast memories which will decrease tuning time up to 95%!

LDG ELECTRONICS **2 YEAR WARRANTY**

List price $149.

Prices and specifications are subject to change. See your local supplier for your best deal.

LDG ELECTRONICS

LDG Electronics, Inc.
1445 Parran Road,
St. Leonard, MD 20685
Phone: 410-586-2177
Fax: 410-586-8475

www.ldgelectronics.com

To order, contact your favorite dealer.

Two VHF/UHF antennas for specialized ham uses have been introduced by Diamond Antennas. These include a handheld beam that can be configured for any frequency between 120 and 500 MHz and a discone that also covers multiple ham bands. Contributing Editor WB6NOA checks them out.

CQ Reviews:

Two New Diamond Antennas
The Tunable Foxhunt Beam and The D220 Discone Antenna

BY GORDON WEST,* WB6NOA

Diamond Antennas has introduced two new VHF/UHF antennas suited for different purposes. However, they have at least one common, if unusual, feature—the ability to operate across a wide range of frequencies. We'll take a look at both in this article.

The Foxhunt Beam

Diamond's new foxhunt beam is a lightweight, handheld, fully adjustable, two-element Yagi that comes with coax cable and an attached BNC connector (see photo A). The beam is intended primarily for radio-direction finding, but it also could be used for enhanced handheld coverage on 2 meters, 222 MHz, and 440 MHz, with about 10 dB better performance than a conventional rubber-duck antenna.

Both of the antenna's elements telescope to different lengths, and along with a slide on the boom to change the spacing between elements (photo B), the antenna can be tuned for direction-finding (DFing) on any frequency from the 120-MHz aeronautical band to 500 MHz with about 5 dBi gain in the main lobe. This means the antenna would work great on ham bands such as 2 meters, 222 MHz, and 440 MHz, for both transmit and receive, and it can be used for receive only on the 121.5-MHz aeronautical emergency frequency and the 243-MHz ELT (Emergency Locator Transmitter) frequency. It's also quite usable in tracking down noisy power lines as well as in-home noise sources on nearly any frequency, when properly configured.

The telescoping elements are not thin aluminum, but rather are stainless steel, which is hard to break. When not in use, the elements telescope in and fold up alongside the boom (photo C). A unique spring-action sleeve magically pops into place when the elements are ready for configuration.

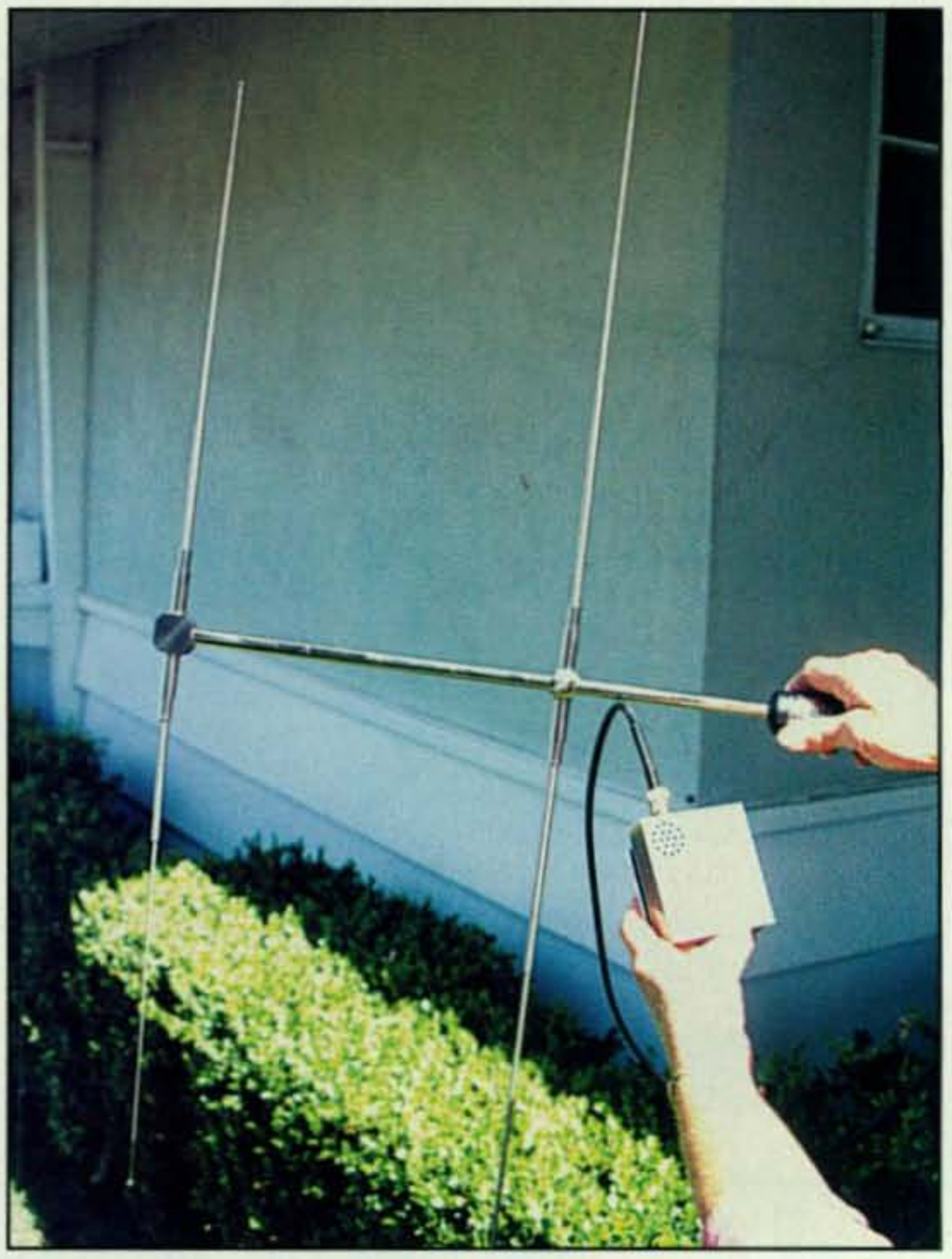


Photo A– The 2-element handheld Diamond beam works with an HT or a direction-finding receiver and can be adjusted to resonance on any frequency between 120 and 500 MHz.

*Contributing Editor, 2414 College Dr., Costa Mesa, CA 92626
e-mail: <wb6noa@cq-amateur-radio.com>

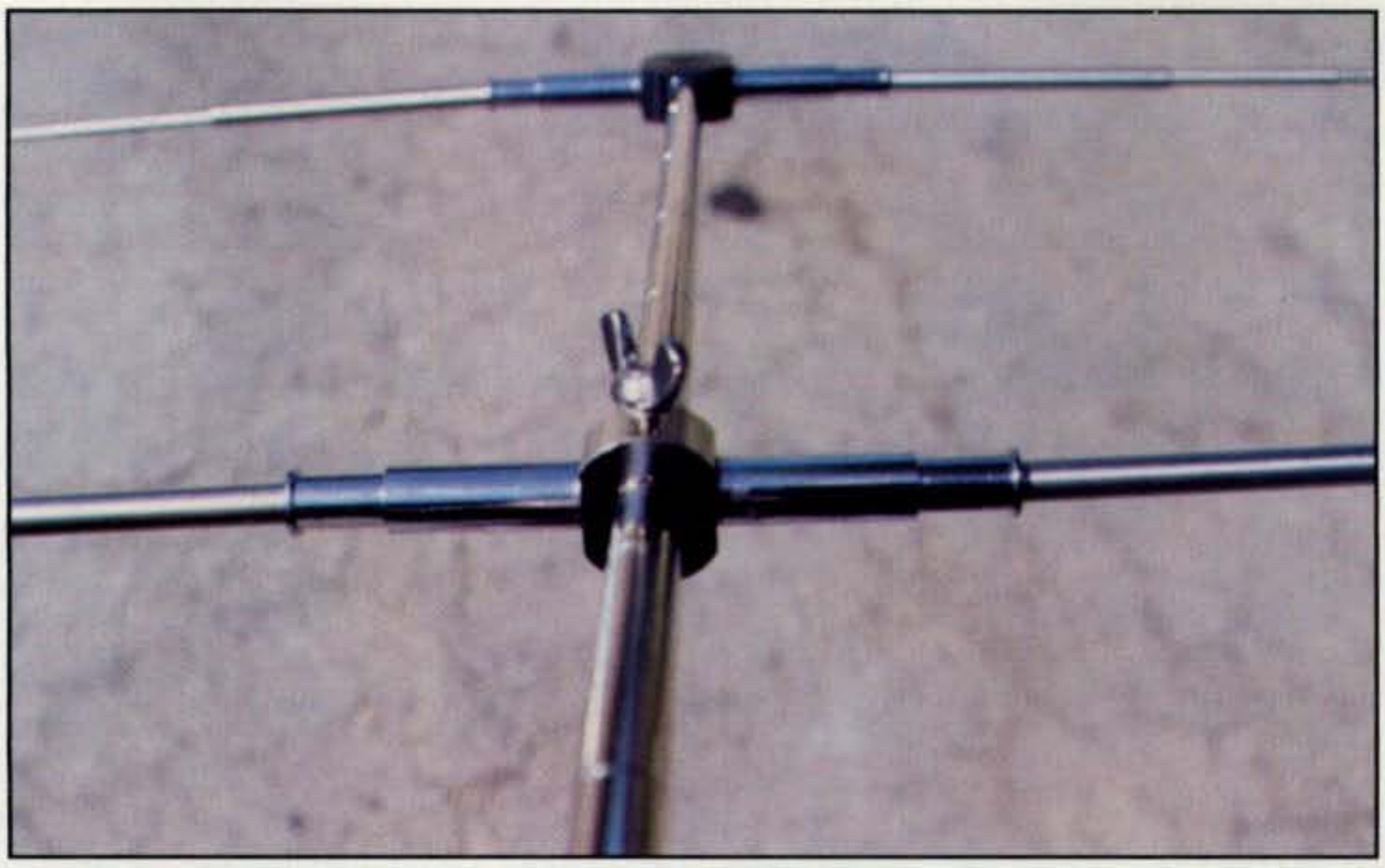


Photo B– A wing-nut allows you to adjust the spacing between the driven element (at the end) and the reflector, providing the right element spacing for your chosen frequency. Each of the elements also telescopes to preset lengths based on your frequency of operation.

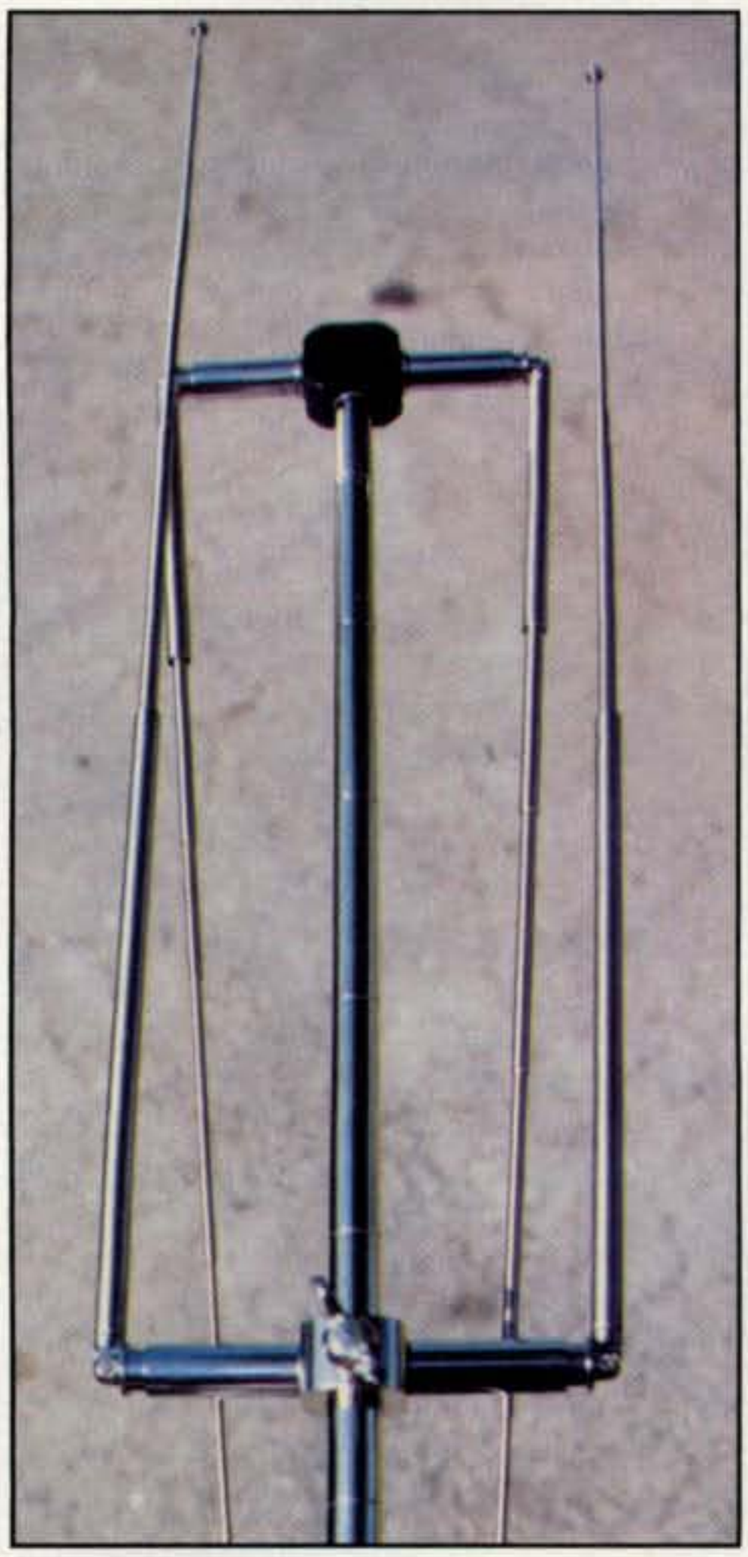


Photo C– The beam folds up when not in use. You may either collapse the elements or leave them tuned to a specific frequency as shown here, so you don't have to retune every time you stop during an on-road foxhunt.

Say what? Configuration means first consulting the yellow plastic chart (photo D) and determining space between elements. The driven element/director is fixed at the end of the boom, so you measure the length from the front element to the reflector, which may slide up and down the stainless-steel boom. The measurements are in centimeters, but don't worry. Diamond also supplies a handy centimeter tape measure. Once you have the reflector in the right spot, just tighten down the wing nut and the element spacing is set. I found that the spacing is not super-critical, so a centimeter this way or that way won't make much difference.

Next consult the chart for lengths of the shorter driven/director elements and the longer reflector elements. The element lengths are measured on one side, also in centimeters. Again, one centimeter too much or too little didn't seem to affect the DF performance of the antenna at all. After the element spacing and lengths are set, hook the yard-long coax with attached BNC to your HT or your direction-finding receiver. Now swing the boom and enjoy!

We tested on an HT on the 2-meter band and directionality was remarkable. We tested again on the 218-MHz Pet Tracker channel, and this little handheld two-element beam offered remarkable front-to-back ratio and good side-lobe rejection. Next we reconfigured the antenna for 440 MHz and found it to be hot and azimuth selective, letting us peak up a weak signal with little margin of error.

Best of all, we liked the construction. Instead of lightweight aluminum, the telescoping whips are stainless steel, and they stay in place even when you are T-hunting in the brush. When you are finished, you can either collapse the antenna all the way down or simply fold up the elements against the boom, maintaining element length and boom spacing for quick deployment.

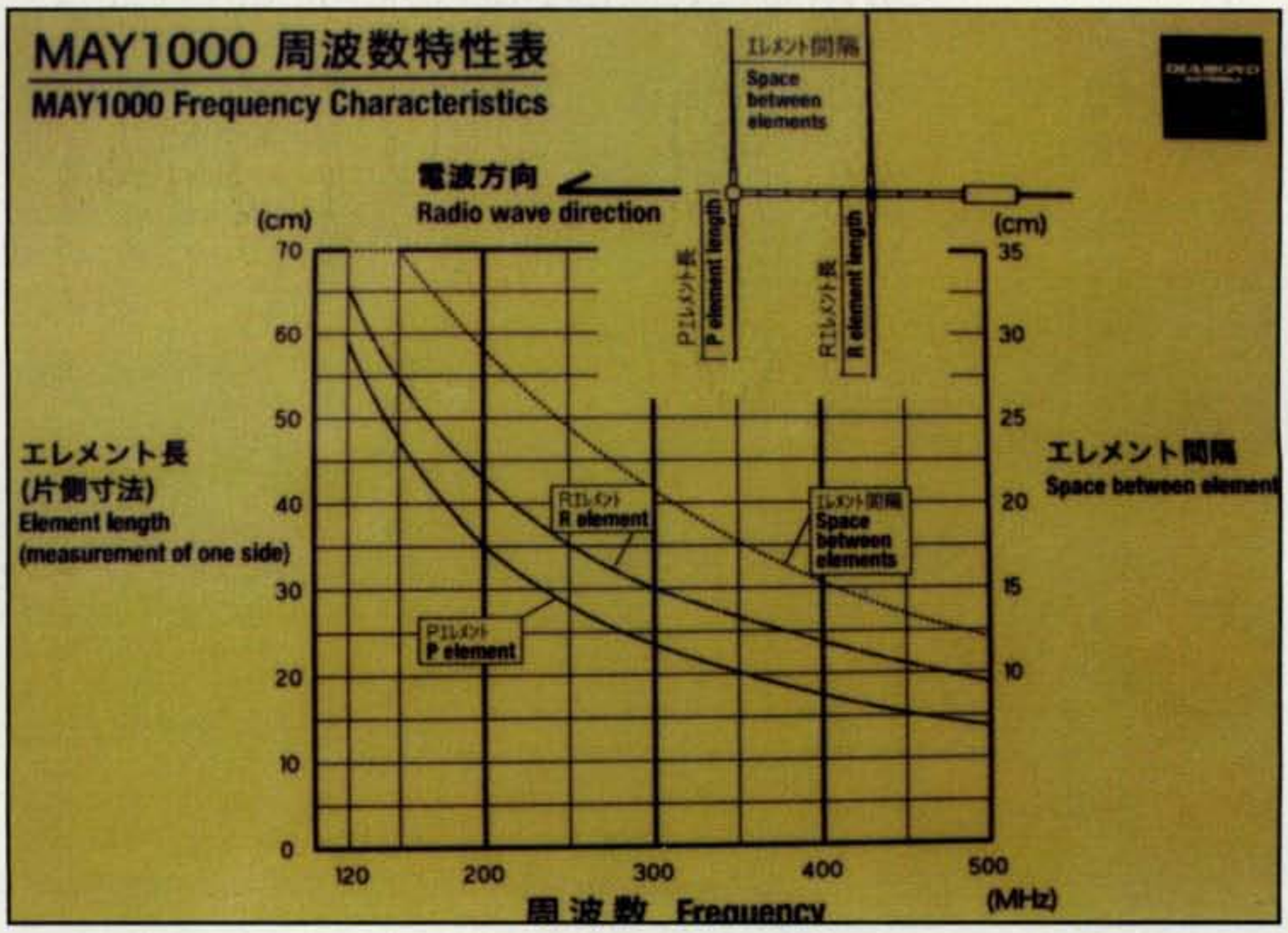


Photo D– Don't lose this yellow plastic card! It's your essential guide to element lengths and spacings (in centimeters) for each frequency of operation.

Photo E– The Diamond D220 discone antenna is smaller than many similar antennas and is designed for mobile as well as fixed-station use. It covers 100-1600 MHz on receive, with transmit capabilities on 2 meters, 70 centimeters, 900 MHz, and 1200 MHz.

Photo F– WB6NOA got good results with the discone mounted on his van, compared with single-band antennas for the ham bands it covers. (See text for details.)

This handy portable beam should show up soon at most Diamond Antenna dealers. Suggested retail price probably will be a little over $100, but the antenna is well worth it if you are looking for a compact beam with 6 dBi of forward gain for good directionality.

The Diamond D220 Discone

The discone antenna design has been around for years. It has been a favorite of the military for covering wide ranges of frequencies with a single antenna. The new Diamond D220 discone receives anywhere between 100 MHz and 1600 MHz, with ham-band transmit capabilities on 144 MHz, 440 MHz, 904 MHz, and 1200 MHz (but not 222 MHz).

The Diamond discone antenna offers outstanding broadband reception performance with no resistive matching network at the coax input. The discone is omnidirectional and vertically polarized. One note of caution when transmitting: Because it is broadband in design, it may radiate harmonics on multiple frequencies that may be present on your transmitter's output.

The Diamond discone is physically smaller than most military discones that may operate all the way down to 50 MHz. The lowest the Diamond discone operates is 100 MHz, which is perfectly adequate for most scanning applications as well as VHF/UHF ham operation. The length of the loaded black cone elements is tuned to one-quarter wavelength of the lowest frequency, and our tests indeed showed 100 MHz to be about the lowest practical limit of operation. There are six downward sloping elements, with instructions to stagger the fat ones and the skinny ones (see photo E). The horizontal hub elements also appear to be loaded, and they are only a couple of inches long. The upper vertical element—precisely tuned to 2 meters and 440, 904, and 1200 MHz—is about 30 inches long and features two loading coils that provide a perfect match on these four popular ham bands.

The hefty 9-inch long shaft of the Diamond discone terminates to a common UHF connector, male gender, just

like a common coax PL259. This would screw right in to many different types of Diamond Antenna vehicle mounts. This Diamond discone antenna is scaled down from normal "big size." It is assumed that the typical mounting of the antenna would be for mobile use.

We assembled the antenna and tested it on our communications van in place of various single-band antennas (photo F). We were impressed with the results. This one antenna proved to be an equal performer on multiple ham bands, with low SWR. Power rating is a nominal 50 watts, but we were using it more for receive than transmit. The SWR abruptly escalates outside of each ham band, likely influenced by the pre-tuned whip. However, for broadband reception of aviation, marine, military, and land-mobile bands, reception was excellent.

Also included is a set of pole mounts to get this antenna up high on the roof, in the clear, hooked to your scanner or VHF/UHF ham radio. Because by design the discone antenna has unity gain, and with this particular design loaded elements are used to keep things short, it would be a requirement to run ultra-low-loss coax from your rig down in the shack to the antenna on the roof. Belden #9913 or LMR #400 would be the absolute smallest size coax to run to this 0-dB gain, multi-band antenna. However, if you keep coax losses to a minimum, getting the antenna up on the roof of your home will really yield some great results.

When running the antenna mobile, you will enjoy the attention it will get regarding both transmit and receive capabilities. It will also generate attention when you pull into the parking lot and everyone stares at that multi-element antenna hanging on your trunk mount or, in our communications van installation, on a gutter mount that accepts a PL-type connection.

We found the antenna to be structurally sound, but we encourage you to regularly tighten up all elements after a few weeks of driving just to make sure nothing shakes loose. The whip tip is flexible enough to survive mobile encounters with trees, *plus you* should be in good shape using this antenna mobile or on the roof of your home (remembering that top-quality coax is a major home installation requirement).

This antenna will be available soon at ham radio and scanner/monitor dealers.

For more information on either antenna, contact: Diamond Antenna, San Marcos, California; phone 760-744-0900; e-mail: <diamondantenna@rfparts.com>. ■

Announcing:

The 2006 CQ World-Wide RTTY WPX Contest

February 11–12, 2006

Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday

Logs are due no later than March 10, 2006

I. Period of Operation: Single Operator stations may operate only 30 hours of the 48-hour contest period. Off time periods must be a minimum of 60 minutes in length and must be clearly marked on the Summary Sheet. Multi-Operator stations may operate the entire 48-hour contest period.

II. Objective: The object of the contest is for amateurs around the world using RTTY to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 3.5, 7, 14, 21, and 28 MHz bands may be used. No 1.8 MHz or WARC bands**. Observance of established band plans is strongly encouraged.**

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high power categories must not exceed 1500 watts total output power on any band. Only the entrant's callsign may be used to aid the entrant's score. RTTY (Baudot) mode only. No unattended operation or contacts through gateways or digipeaters are permitted.

Any form of DX alerting assistance is permitted in ALL categories.

V. Categories:

1. Single Operator (Single Band and All Band)

(a) Single Operator stations are those at which one person performs all of the operating, logging, and spotting functions. Only one transmitted signal is allowed at any time.

(b) Low Power: Same as 1(a) except that (i) output power is 150 watts or less and (ii) only All Band entrants may enter the Low Power category. Stations in this category compete with other Low Power stations only.

(c) Rookie: An entrant in this category shall, at the time of the contest, have been licensed as a radio amateur for three years or less. If you are entering this category, please indicate it on your Summary Sheet.

2. Multi-Operator (All Band operation only)

(a) Single-Transmitter: Only one transmitted signal at any time. Limited to 6 band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the 6-band change rule will result in reclassification to the Multi-Multi category.

(b) Multi-Two: A maximum of two transmitted signals are allowed as long as each transmitter is on a different band. Each of the two transmitters is limited to 6 band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the 6-band change rule will result in reclassification of the entry to the Multi-Multi category. Each transmitter must keep a chronological log containing its own serial numbers and unique transmitter identifier (0 or 1 in the Cabrillo format).

(c) Multi-Transmitter: No limit to transmitters, but only one signal and running station allowed per band.

3. SWL: SWLs are required to log the callsigns of both the heard and correspondent station. Scores are based only upon the heard station, using the same rules as transmitting stations. Correspondent callsigns may not appear more than three times per band in your log.

VI. Exchange: RS(T) report plus a progressive contact three-digit serial number starting with 001 for the first contact. (Continue to four digits if past 999.) Your log MUST show the correct serial number sent and received for each contact.

VII. Serial Numbers and Identification of Transmitters: Single Operator log entries must contain a progressive three- (or four-) digit serial number sequence starting with 001 for the first contact. Multi-Two log entries must follow the same serial number scheme for each transmitter separately, and identify the transmitter (0 or 1) that makes each QSO. Multi-Transmitter (Multi-Multi) log entries must follow the same serial scheme as Single Operator log entries, but use separate serial numbers for each band.

VIII. QSO Points:

1. Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7 and 3.5 MHz.

2. Contacts between stations on the same continent but in different countries, and contacts with maritime mobile stations, are worth two (2) points on 28, 21, and 14 MHz and four (4) points on 7 and 3.5 MHz.

3. Contacts between stations in the same country are worth one (1) point on 28, 21, and 14 MHz, and two (2) points on 7 and 3.5 MHz.

IX. Multiplier: The multiplier is the number of "valid" prefixes worked. A prefix is counted only once regardless of the number of times the same prefix is worked.

1. A prefix is the letter/numeral combination which forms the first part of the amateur call. Examples: N8, W8, AB8, DL5, DJ2, HG1, WD200, WF96, 3DAØ, GB75, ZS66, U3, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation the portable designator will then become the prefix. Example: AB5KD operating from Wake Island would sign AB5KD/KH9 *or* AB5KD/NH9. American DX (KL7, KH6, KP2, KH3, etc.) operating within the 48 states must sign with a full designator of their choice. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (W8, K8, etc.). United States portable stations are not permitted to select a portable prefix designation. For example, WS7I/2 is permitted, but WS7I/WY2 or WS7I/KZ2 is not. Portable designators without numbers will be assigned a zero (Ø) after the second letter of the portable designator to form a prefix. Example: N8BJQ/PA would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

2. Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

X. Scoring:

1. Single Operator: (a) **All Band** score = total QSO points from all bands multiplied by the number of different prefixes worked (prefixes are counted only once). (b**) Single Band** score = total QSO points on the band multiplied by the number of different prefixes worked.

2. Multi Operator: Scoring is the same as Single Operator, All Band.

3. A station may be worked once on each band for QSO point credit.

XI. Awards: First-place certificates will be awarded in each category listed under Section V in every participating country and in each call area of the United States, Canada, Australia, and Japan. All scores will

be published. To be eligible for an award a Single Operator station must operate at least 12 hours. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. (Single-band entrants who also operate on other bands are encouraged to submit their logs to aid in the log-checking process. *Note:* Logs containing more than one band will be judged as all-band entries unless they are submitted in Cabrillo format and the single band entry is specified in the Cabrillo header.) All certificates and plaques will be issued to the licensee of the station used. To the extent sponsors or winners purchase plaques through the Contest Director, plaques will be awarded in the following geographical areas for each of the categories listed in Rule V: World, North America, USA, Canada, South America, Africa, Europe, Asia, and Oceania.

XII. Instructions for Preparation of Logs:

1. We want your electronic log. It should be submitted in Cabrillo format via e-mail to <wpxrtty@ kkn.net>. Logs must be submitted no later than March 10, 2006. **In the "Subject:" line of your e-mail message please include your callsign**. Logs should be sent as an e-mail attachment, not in the text of the e-mail, and the filename for the log should be *yourcall.log*. Receipt of all e-mailed logs will be confirmed via return e-mail. To view a sample Cabrillo QSO template for this contest, go to <www.kkn.net/~trey/cabrillo/ wpx-rtty.txt>.

2. Entries from Multi-Two and Multi-Multi stations must be merged *into* a single chorono-logical log. In the case of Multi-Two stations, the log must also indicate clearly which station (shown as 0 or 1 in column 81 of the Cabrillo log) made each contact.

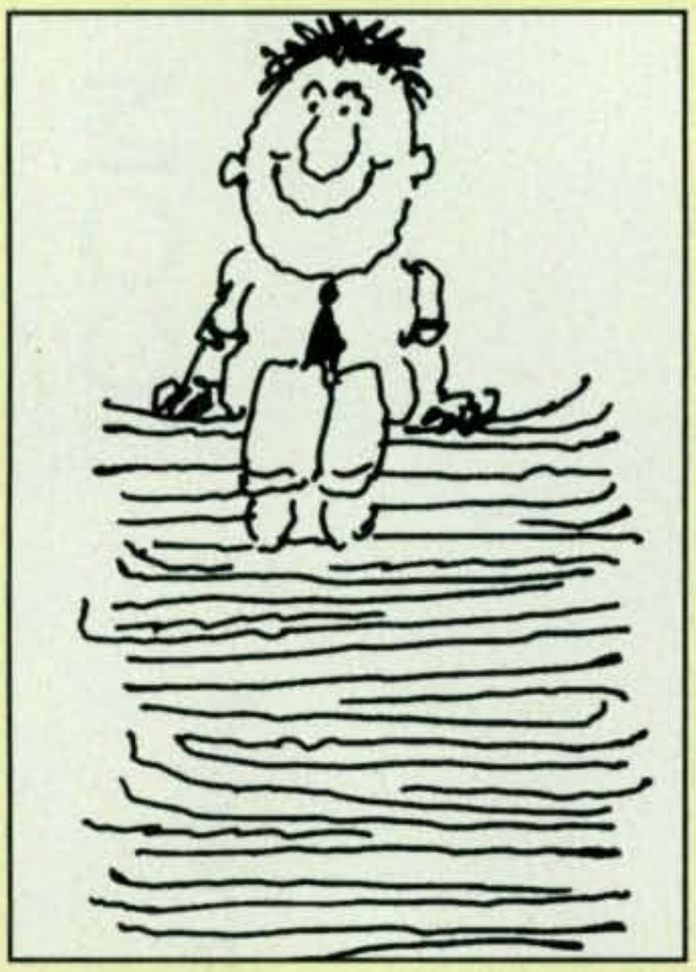
3. If the Cabrillo format is unavailable, contact the Log Checker, Paolo Cortese, I2UIY, at <I2UIY@cqww.com>.

Other questions pertaining to the CQ WPX RTTY Contest may be sent to the WPX RTTY Contest Director, Glenn Vinson, W6OTC, 488 Locust Street, #401, San Francisco, CA 94118 USA, e-mail: <w6otc@garlic.com>.

4. If you must submit a disk or paper log, send it to CQ RTTY WPX Contest, 25 Newbridge Road, Hicksville, NY 11801 USA. However, all logs containing more than 100 QSOs and which were generated using a computer program ***must*** be submitted via e-mail or on a 3.5-inch floppy disk. Log and summary sheets are available for download on the CQ website, <www.cq-amateur-radio. com>, or with SASE from CQ at the address listed above.

XIV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is deemed by the WPX RTTY Contest Committee to contain a large number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he or she will be ineligible for any CQ contest awards for three years.

XV. Deadline: All entries must be submitted NO LATER than **March 10, 2006.** E-mail logs are subject to the same deadline. Logs postmarked after the deadline may be listed in the results but will be ineligible for any awards.



What You've Told Us...

Predictably, our October survey on code usage drew a heavy response. Nearly half of the readers who responded consider their code proficiency level to be either expert (18%) or advanced (30%), with another 30% describing their skill level as intermediate, while 19% consider themselves beginners and 4% don't know Morse code.

Our next question asked about respondents' level of code activity versus other modes. More than four in ten operate CW exclusively (15%) or most of the time (26%), while 19% say they use CW about half the time they're on the air, 17% say they operate code once in a while, 11% use it rarely and 15% never use code on the air.

Next we asked about activities in which you use code *some of the time* and *most of the time*. There was a split between HF DXing and ragchewing, with 41% using CW most of the time for DXing (along with 22% some of the time); while 25% use it some of the time for ragchewing and 36% do most of their ragchewing in code. This was followed by contesting (30% most of the time, 20% some of the time); VHF DXing (12% some, 6% most); other (10% most, 7% some), and traffic-handling (6% some, 3% most). In addition, 16% don't operate CW some of the time or most of the time for anything.

Asked your *primary* reason for operating CW, 55% of you said "enjoyment of the mode," followed by "its ability to get through in marginal conditions (25%), that CW operators are better-behaved (14%), its simplicity and efficiency (12%) and other (6%); along with 16% who don't operate CW at all.

Finally, we asked if you would have learned the code even if it wasn't required for earning or upgrading your license. Nearly half (48%) said yes, while 35% said no, 15% weren't sure, and 3% still haven't learned it.

This month's free subscription winner is Jim Horn, KA7GKP, of Issaquah, Washington.

Reader Survey January 2006

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

The FCC has proposed eliminating Morse code testing for all levels of amateur licenses, but turned down (so far) suggestions for either a new entry level license with HF privileges or any changes in operating privileges for current licensees. This month, we'd like to hear your views on various aspects of the FCC proposal (WT Docket 05-235).

Please answer by circling the appropriate numbers on the reply card.

1. What is your opinion of the FCC's proposal to eliminate the code test requirement for the General Class license?
- Strongly agree 1
- Agree 2
- Neither agree nor disagree 3
- Disagree 4
- Strongly disagree 5

2. What is your opinion of the FCC's proposal to eliminate the code test requirement for the Extra Class license?
- Strongly agree 6
- Agree 7
- Neither agree nor disagree 8
- Disagree 9
- Strongly disagree 10

3. What is your opinion of the FCC's decision NOT to propose a new entry-level license with HF privileges?
- Strongly agree 11
- Agree 12
- Neither agree nor disagree 13
- Disagree 14
- Strongly disagree 15

4. What is your opinion of the FCC's decision NOT to propose any changes in the operating privileges of existing license classes if the code test is eliminated?
- Strongly agree 16
- Agree 17
- Neither agree nor disagree 18
- Disagree 19
- Strongly disagree 20

5. What is your opinion of making the General Class the entry level license for HF operating if the code test is eliminated?
- Strongly agree 21
- Agree 22
- Neither agree nor disagree 23
- Disagree 24
- Strongly disagree 25

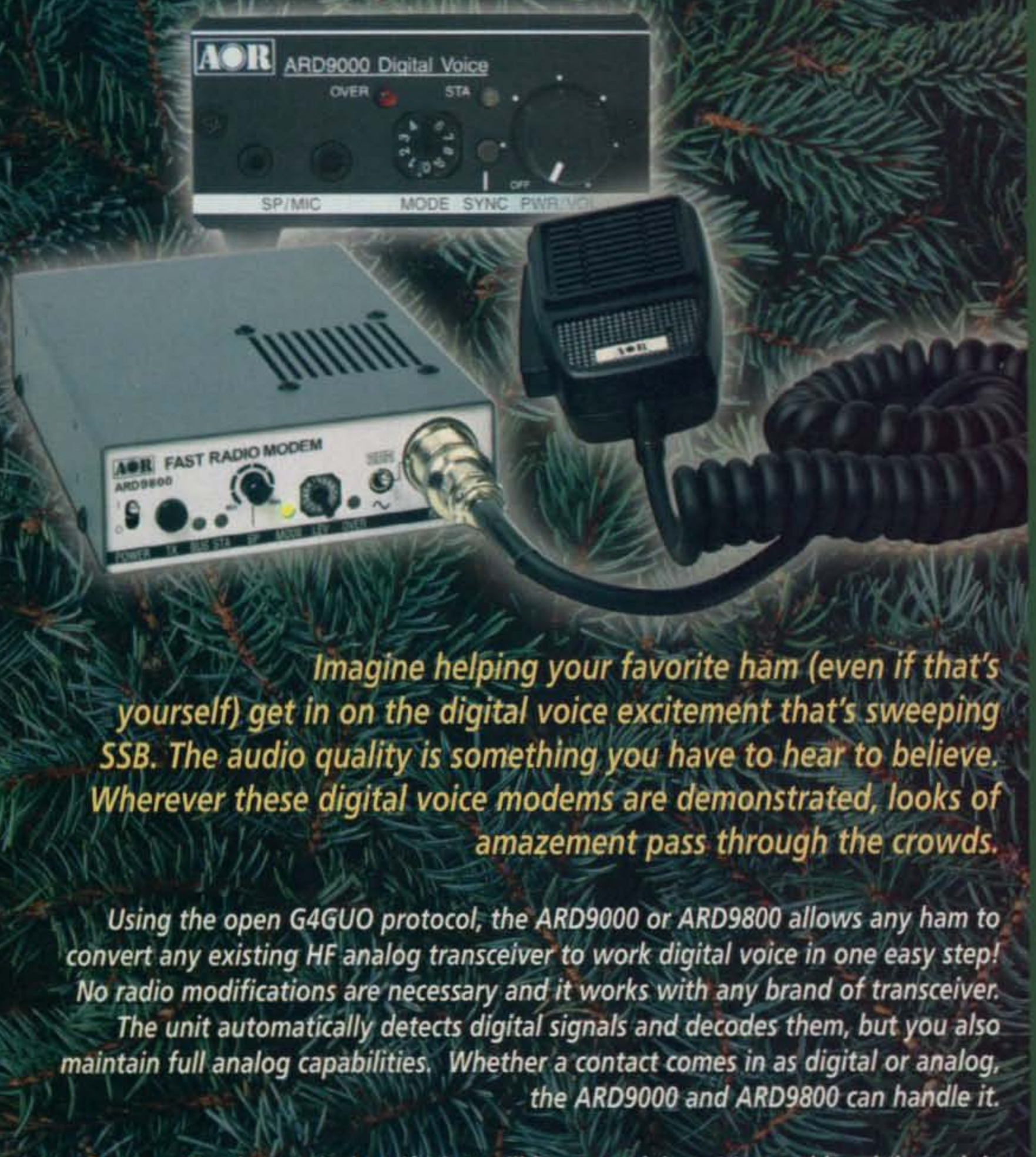
6. What is your opinion of giving limited HF privileges—those now given to Novices and Techs with code—to all Technicians if the code test is eliminated?
- Strongly agree 26
- Agree 27
- Neither agree nor disagree 28
- Disagree 29
- Strongly disagree 30

Thank you for your responses. We'll be back with more questions next month.

'Tis the Season to Give. Receive. And Transmit!

Want a perfect holiday gift idea for your favorite ham?

The ARD9000 and ARD9800 are great choices because both put the fun back into Amateur Radio.



Imagine helping your favorite ham (even if that's yourself) get in on the digital voice excitement that's sweeping SSB. The audio quality is something you have to hear to believe. Wherever these digital voice modems are demonstrated, looks of amazement pass through the crowds.

Using the open G4GUO protocol, the ARD9000 or ARD9800 allows any ham to convert any existing HF analog transceiver to work digital voice in one easy step! No radio modifications are necessary and it works with any brand of transceiver. The unit automatically detects digital signals and decodes them, but you also maintain full analog capabilities. Whether a contact comes in as digital or analog, the ARD9000 and ARD9800 can handle it.

Give (or receive) a gift that will keep on giving. It's a real breakthrough in communications technology that uses the same audio frequencies (300 Hz ~ 2500 Hz) as microphone audio to transmit digital SSB voice signals. It's like adding a whole new mode to your HF radio without having to buy a new one!

- NO transceiver modifications necessary
- Digital voice communications using existing analog transceivers
- Works on Single Side Band (SSB) mode.
- Automatic digital receive
- Optional interface cables for most popular transceivers
- Built-in high grade Vocoder (AMBE)
- Built-in FEC protocol
- Compact unit. Easy to operate.
- Utilizes a uniquely designed high performance DSP engine
- Uses the established G4GUO open protocol
- ARD9800 can also be used for digital slow scan TV and data transmissions (images require optional memory board)

Be sure to check the website at www.aorusa.com for FAQs, links to user groups and more!

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washington readout

BY FREDERICK O. MAIA,* W5YI

New Technology May Allow BPL and Ham Radio to Co-exist

Is the controversy between the supporters of BPL (Broadband over Power Lines) and the ham radio community nearly over? Due to recent technological advances, that just might become the case.

It has been a little more than a year since the FCC adopted rules to facilitate the use of residential AC power lines as carriers of high-speed communications. BPL systems use existing electrical utility wiring as a transmission medium by coupling RF energy onto the power line. It has been a rocky year to say the least. However, new systems that take a different approach to BPL signal transmission plus a new proposal to the FCC from the ARRL have the potential of bringing an end to the BPL wars and allowing both BPL and HF radio users to peacefully coexist.

The journey to unleash BPL actually began in earnest in the spring of 2003 after the FCC Commissioners witnessed a demonstration of the technology at a home in neighboring Maryland. It was there that Current Technologies had established a test site in cooperation with the Potomac Electric Power Company. Without exception, the FCC came away from that demonstration very impressed, and all Commissioners issued statements (see sidebar).

In April 2003 the FCC released a Notice of Inquiry (ET Docket No. 03-104) looking for further information on BPL. The document noted that harmful interference can be caused to radio communications in two ways: "First, the RF energy may be carried through the electrical wiring to other devices also connected to the electrical wiring. Second, at frequencies below 30 MHz, where wavelengths exceed 10 meters, long stretches of electrical wiring can act as an antenna, permitting the RF energy to be radiated over the airwaves."

One of the questions on which the FCC specifically wanted input was "What interference issues must be addressed with the deployment of high-speed power-line carrier systems?"

In July 2003 The American Radio Relay League responded to the Notice of Inquiry on behalf of the amateur radio community. The ARRL restated the "...fundamental principle that incumbent, licensed radio services, including the Amateur Service, must be protected from interference" from unlicensed services, including BPL. The League also noted the "... poor track record of utilities generally in dealing with large numbers of interference complaints..." gave them no reason to believe that "(1) BPL can coexist with Amateur operation at HF or VHF, or (2) that when the inevitable interference is experienced, the interference problems could or would be rectified." The ARRL comments added that "BPL system radiated levels are complex and difficult to measure due to the length of the power line acting as an antenna."

The League concluded that BPL was a "...a Pandora's Box of unprecedented proportions" and asked that the Commission "...take no steps to permit access or in-building BPL at HF or VHF at this time."

As expected, comments from BPL business interests overwhelmingly supported its deployment. It was obvious that both industry and the FCC wanted BPL, and the measure was put on "fast track" rulemaking. The issue went to the Notice of Proposed Rulemaking stage in less than a year (February 2004) with an unbelievably short 45-day comment and 30-day reply period. Eight months later, on October 14, 2004, the FCC released an 86-page Report and Order basically adopting its proposals for broadband over power lines "...to increase competition and promote broadband service to all Americans." The ARRL filed a Petition for Reconsideration calling the FCC action "...a classic case of prejudgment." It undoubtedly was. Each Commissioner's stated position had been known for more than a year, and the rulemaking was little more than an exercise in government-required paperwork.

BPL testing and rollout began in earnest shortly thereafter. The typical Access BPL system used HF frequencies to overlay the internet on medium-voltage power lines running through residential neighborhoods. Usually, repeaters were placed along long utility power lines to boost the power level every so often. A final converter coupled the RF signal to the low-voltage AC lines going into a home. Every ham operator knows what happens when you place wideband radio frequency signals on wire: you get radiation across the HF spectrum. The interference to sensitive radio receivers was chaotic.

Importance of Broadband

Whether ham operators like it or not, BPL is a technology that is not going away—far from it. Billions of dollars have already been invested by electronic manufacturers, electric utility companies, and their partners. Also, cities in several states have already deployed commercial BPL and trials are under way in more than half of all U.S. states, with many more on the way. What was once a crawl toward BPL is now a mad rush.

The U.S. government and industry are solidly behind broadband deployment. New FCC Chair-

*1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

Commission 2003 Statements on BPL

"The potential of this new technology is immense. Broadband over power lines can offer consumers freedom to access broadband services from any room in their home without need to pay for additional wiring, by simply plugging an adaptor into an existing electrical outlet. Power line technology also provides for useful redundancy and diversity in communications networks that are key aspects of secure homeland communications." . . . *(Former) FCC Chairman Michael K. Powell.*

"Because power lines reach virtually every community and every home, BPL systems have the potential to become a last-mile solution throughout the United States. As such, they would not only provide competition to cable broadband and DSL, they could bring Internet access and high-speed broadband to rural and isolated areas which have been difficult to serve because of the high infrastructure costs of reaching those areas." ... *FCC Commissioner Kevin J. Martin (now Chairman)*

"The promise of BPL systems is enormous. One of my top priorities as a Commissioner is to speed the deployment of broadband and other advanced services. I believe that the Commission must do what it can to extend the benefits of the latest broadband technologies—such as broadband over power line—to all Americans, whether they live in the inner city, the suburbs, or rural areas." . . . *FCC Commissioner Jonathan S. Adelstein*

"We could be on the cusp of bringing new competition to the deployment of broadband and doing so via technology with tremendous potential to reach not only the easily reachable, but also our hard-to-reach fellow citizens living in rural areas." . . . *FCC Commissioner Michael J. Copps*

"The true key to achieving Congress's objective of a deregulatory and procompetitive framework lies in moving beyond duopoly (two producers, DSL and cable modems) towards a world where multiple facilities-based providers compete in the broadband arena. Innovations such as broadband over power line systems hold great promise in bringing us closer towards fulfillment of that goal." . . . *FCC Commissioner Kathleen Q. Abernathy*

man Kevin Martin recently said that broadband development will be the "number one priority" of his term of office. The FCC defines broadband as data transfer at speeds that exceed 200 Kbps. BPL is being seen as a way to get the high-speed internet to the masses quickly and at lower cost, since the infrastructure is already in place. Power lines are everywhere. Right now more than 90 percent of all U.S. broadband is delivered by two-way DSL and cable modems, with cable being the most popular by far. Worldwide, however, there are twice as many DSL connections as cable connections.

Simply stated, economic growth, higher productivity, and a better quality of life are directly related to how many people can use the internet and how fast their connections are. Increasingly, too, efficient services and applications are becoming more deeply linked to high-speed broadband access.

The Brookings Institution, a respected Washington, DC think tank, reported "Productivity growth and military power are now driven primarily by information systems, which are becoming heavily internet-dependent. As digital technology continues its progress, the broadband problem is becoming a major bottleneck in the U.S. and world economy."

The internet was born in the United States. Once a leader in internet innovation, the U.S. is now falling behind Japan and other Asian countries. The Bush administration disputes

that, noting that the U.S. leads the world in the total number of high-speed users.Statistics show, however, that on a per capita basis (number of high-speed connections per 100 inhabitants), South Korea leads the world. The United States ranks twelfth. Contrary to what you may have heard, studies show that the "basic" broadband services in American homes are among the slowest, most expensive, and least reliable in the developed world.

According to a new study, "The State of Consumer Technology," by Forrester Research, broadband deployment will double to two-thirds of all U.S. households by 2010. Impressive? Hardly. In South Korea 75 percent of households already have high-speed access. The major impediment to U.S. broadband adoption is price. A month of high-speed internet access in South Korea costs about half that paid by American consumers.

BPL is seen as a way of expanding the number of ways that broadband can be received. The thinking is that since its cost is less, BPL pricing should have an impact on other delivery methods that would need to stay competitive.

There are other major hurdles to overcome before we see the widespread adoption of BPL. Obtaining consumer interest in the technology will take both time and money. Utility companies also will have to learn how to market and service what is a completely new business for them.

An additional concern is that each city and state has different regulatory requirements. Many states, such as Texas, are in the process of adopting new Public Utility legislation to deal with BPL. Ham operators will be interested in the section that deals with interference. It reads:

"Sec. 43.152. COMPLIANCE WITH FEDERAL LAW. BPL operators shall comply with all applicable federal laws, including those protecting licensed spectrum users from interference by BPL systems. The operator of a radio frequency device shall be required to cease operating the device upon notification by a Federal Communications Commission or Public Utilities Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected."

So where's the good news in all of this?

Motorola Joins the BPL Rollout

Last summer Motorola introduced a new commercial BPL solution at the United Telecom Council's "Telecom 2005 Expo" held in Long Beach, California. The new system combines BPL with the company's own proprietary wireless broadband platform.

Motorola calls the finished solution "Powerline LV." The LV stands for low-voltage. The system does not use medium-voltage wiring and introduces broadband signals only on the low-voltage side of the power transformer, making it far less likely to either cause or suffer from interference.

Powerline LV requires only three pieces of hardware to connect a customer's home to the broadband network: the Powerline LV access point, an antenna/router, and a "HomePlug" modem. No other cabling or wiring is required and start-up costs are minimal. As noted earlier, the potential market for BPL is substantial. Motorola estimates that as many as 13-million U.S. households are unable to receive broadband from DSL or cable-modem providers, and millions more would be interested in receiving the high-speed internet over their house wiring if the cost was less than existing delivery methods. ARRL Chief Executive Officer David Sumner, K1ZZ, made it clear that the League is not opposed to BPL. "We are opposed to BPL interference. If it were possible to send broadband signals down power lines without causing radio interference, we would have no objection to BPL."

Sumner said that while no Access BPL system can be totally free of radio interference, *Motorola*'s new system is the first that incorporates design features that should reduce the probability of interference to radio amateurs "...down to a reasonable level where it is can be addressed on a case-by-case basis." He called the Powerline LV solution "...simply better engineering."Besides avoiding higher voltages, "...Motorola uses its 'Canopy' wireless broadband system. So, those long, unshielded power lines that run alongside the road and through the neighborhood never enter the picture." Furthermore, Sumner added, Motorola uses "HomePlug" modems which are notched to avoid the ham bands on the low-voltage line between the transformer and the customer's home. Additional hardware filtering provides additional protection against interference.

Sumner pointed out that "...if there is still interference to shortwave broadcast reception, the BPL hardware can be removed and a wireless link installed in its place."

Sumner also noted that another approach being taken by Current Technologies to avoid the use of HF frequencies on the medium-voltage lines by using low-band VHF (30-50 MHz) frequencies also has merit. "So far, BPL tests have proceeded without major interference problems."

ARRL Seeks to Resolve BPL Interference Issue

On October 18, 2005 the ARRL filed a Petition for Rulemaking with the FCC offering to withdraw its still pending Petition for Reconsideration if it would issue a Further Notice of Proposed Rulemaking adopting new BPL rules incorporating recent "technical advancements in Broadband-Over-Power Line technology." The League said its proposed amendments, together with existing Part 15 regulations will, for the first time, "...satisfactorily address the serious interference potential of access BPL systems to licensed radio services, fixed and mobile."

The ARRL now agrees that several BPL systems have shown that it is "...technically and economically feasible to implement BPL without causing harmful interference to Amateur Radio operations."

The League also said in the petition that it now has had the opportunity to perform tests and evaluations of certain other BPL architecture, including those of Current Technologies, which "...can be operated without substantial risk of interference to Amateur Radio facilities." Other companies are also marketing BPL systems that would meet the League's interference requirements. "It is no longer the case," the ARRL said, "that all BPL systems inherently radiate high levels of RF energy on Amateur allocations on overhead medium voltage power lines. By stark contrast, those BPL systems which use technology that makes use of HF spectrum (including Amateur allocations) on unshielded overhead medium voltage lines for signal transmission have caused numerous cases of harmful interference to stations in the Amateur Service."

The League believes that there is now, before any significant deployment of BPL technology has begun nationwide, an "opportunity of limited duration" for the FCC to issue a Further Notice of Proposed Rule Making adopting certain amended regulations to limit interference potential by permitting BPL system designs that adequately protect licensed radio services.

The proposed additional regulations would permit BPL system designs that do not use HF on overhead power lines and those using HF only on low-voltage wiring with fixed, per-

manent notches in the amateur bands (such as those using the HomePlug standard) and would discourage the first-generation, interference-causing BPL configurations.

The League was especially complimentary of Motorola's broadband over power-line efforts, saying that its Powerline LV BPL system, which doesn't use medium-voltage power lines, has "...been carefully designed to preclude interference to Amateur Radio and other licensed services."

"For several weeks the ARRL and Motorola have cooperated in a BPL test stand at W1AW (the ARRL Headquarters station) that has operated successfully without significant interference to Amateur Radio," the ARRL said. The League also cited BPL systems by Current Technologies, IBEC, and Corridor Systems as being among those which meet the additional requirements it's proposing.

Current Technologies' BPL deployment in the Cincinnati, Ohio, area, for example, does not make use of medium-voltage lines for transmission of HF signals and utilizes the HomePlug notching protocol. Limited testing, the ARRL said, indicates that as a result the interference potential "is minimal relative to Amateur Radio facilities." "Incorporating three elements into the BPL rules adopted last year would essentially resolve all issues that the ARRL and the Amateur Service have with access BPL," the League said. They are:

(1) All access BPL systems would be prohibited from using amateur radio allocations (except the discrete five channels at 5-MHz channels which are not excluded from the current HomePlug systems) in their system architecture;

(2) All access BPL systems would be prohibited from using HF bands on medium-voltage power lines; and

(3) Signal decay from access BPL systems will be measured using a more accurate 20-dB/decade extrapolation factor rather than the 40-dB/decade factor the current rules support.

"Each of these three elements is necessary, and all three are sufficient to resolve all issues that ARRL and the Amateur Service have with authorizing Access BPL generally," the ARRL said.

The League believes that all present BPL designs will, after a reasonable transition period, be able to meet the proposed additional BPL rules. "None of the additional requirements would necessitate extensive system redesign, save for the need for additional filtering." "In essence, the real divide is that companies such as Motorola, Current Technologies, IBEC, and Corridor Systems all have designs that do not use HF at all on overhead power lines, and they avoid the use of Amateur Radio spectrum in all parts of their systems, other than at 5 MHz," the ARRL noted.

Adopting its proposals, the League said, would result in a more robust product that meets the Commission's stated goals of accommodating BPL as an additional broadband option while protecting licensed radio services. "The present BPL rules achieve the first of the goals, but they are woefully inadequate to meet the second," the ARRL said.

"It is the Commission's obligation to recognize and utilize this opportunity and to amend its rules to protect licensed radio services for the first time in this proceeding," the ARRL concluded.

As of press time the FCC had not responded to the ARRL's proposal.

73, Fred, W5YI

Announcing:

The 2006 CQ World-Wide WPX Contest

SSB: March 25–26, 2006 CW: May 27–28, 2006
Starts: 0000 GMT Saturday Ends: 2359 GMT Sunday

I. Period of Operation: 48 hours. Single Operator stations may operate 36 of the 48 hours. **Off times must be a minimum of 60 minutes in length**. Listening time counts as operating time. Multi-Operator stations may operate the full 48 hours.

II. Objective: The object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 1.8, 3.5, 7, 14, 21, and 28 MHz bands may be used. No WARC bands allowed. ***Observance of established band plans is strongly encouraged***.

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Only the entrant's callsign may be used to aid the entrant's score. A different callsign must be used for each entry. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high power categories must not exceed 1500 watts total output power on any band. No self-spotting of any form on DX spotting nets is permitted for any category. Self-spotting is defined as generating packet spots for your contest callsign by: (a) using your own callsign; (b) spotting your call while using another callsign; or (c) spotting of your callsign by other stations as a result of prearranged solicitation.

Categories: *Note*—CATEGORY and CATEGORY-OVERLAY** names for use in the CABRILLO file header are shown in (*italics*).

1. Single Operator (Single Band and All Band) (*SINGLE-OP ALL HIGH or SINGLE-OP [BAND] HIGH*)

(a) One person performs all of the operating, logging, and, for the Assisted category only, spotting functions. Only one transmitted signal is allowed at any time. **Maximum power allowed is 1500 watts total output**.

(b) Low Power: (*SINGLE-OP LOW or SINGLE-OP [BAND] LOW*): Same as 1(a) except that output power shall not exceed 100 watts. Stations in this category will compete only with other low power stations.

(c) QRP (*SINGLE-OP ALL QRP or SINGLE-OP [BAND] QRP*): Same as 1(a) except that output power shall not exceed 5 watts. Stations in this category will compete only with other QRP stations.

(d) Assisted/with Packet (*SINGLE-OP-ASSISTED ALL HIGH or SINGLE-OP-ASSISTED ALL LOW*): Same as 1(a) except the passive use (no self-spotting) of DX spotting nets or other forms of DX alerting is permitted. Stations in this category will compete only with other Assisted stations.

****The next two categories shown below require an additional line in your Cabrillo logfile header called CATEGORY-OVERLAY. See paragraph XIV(d).**

(e) Tribander/Single Element (*TB-WIRES*)**: Tribander (any type) for the high bands with a single feedline from the transmitter to the antenna, and single-element low-band antennas (wires) category. During the contest an entrant shall use **only one (1) tribander** for 10, 15, 20 meters and **single-element antennas** on 40, 80, and 160.

(f) **Rookie** (*ROOKIE*)**: To enter this category you must have been licensed as a radio amateur three (3) years or less on the date of the contest.

2. Multi-Operator (All band operation only, high power only)

(a) Single-Transmitter (*MULTI-ONE*): Only one transmitter and one band permitted during the same time period (defined as 10 minutes). **Exception: One other band may be used during any 10-minute period if the station worked is a new multiplier. Use separate serial numbers for the multiplier station. Logs found in violation of the 10-minute rule will be automatically reclassified as multi-multi. Maximum power allowed is 1500 watts total output. Your log MUST show the correct serial number sent and received for each contact.**

(b) Multi-Two (*MULTI-TWO*): A maximum of two transmitted signals at any time on different bands. Both transmitters may work any and all stations. A station may be worked only once per band regardless of which transmitter is used. **Each transmitter must keep a chronological log containing its own serial numbers and unique transmitter identifier.** Each of the two stations may make a maximum of 8 band changes in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. **Maximum power allowed is 1500 watts total output.**

(c) Multi-Transmitter (*MULTI-MULTI*): No limit to transmitters, but only one signal (and running station) allowed per band at any time. Note: All transmitters and receivers must be located within a 500-meter diameter area or within property limits of the station licensee, whichever is greater. All operation must take place from the same operating site. **Maximum power allowed is 1500 watts total output.**

V. Exchange: RS(T) report plus a progressive contact three-digit serial number starting with 001 for the first contact. (Continue to four digits if past 999 and five if past 9999.) **Multi-operator, multi-transmitter stations use separate serial numbers for each band. Your log MUST show the correct serial number sent and received for each contact.**

VI. Contact Points:

(a) Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7, 3.5, and 1.8 MHz.

(b) Contacts between stations on the same continent, but different countries, are worth one (1) point on 28, 21, and 14 MHz and two (2) points on 7, 3.5, and 1.8 MHz. **Exception:** For North American stations only—contacts between stations within the North American boundaries (both stations must be located in North America) are worth two (2) points on 28, 21, and 14 MHz and four (4) points on 7, 3.5, and 1.8 MHz.

(c) Contacts between stations in the same country are worth 1 point regardless of band.

VII. Prefix Multipliers: The prefix multiplier is the number of valid prefixes worked. A PREFIX is counted only once regardless of the number of times the same prefix is worked.

(a) A PREFIX is the letter/numeral combination which forms the first part of the amateur call. Examples: N8, W8, WD8, HG1, HG19, KC2, OE2, OE25, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation, the portable designator will then become the prefix. Example: N8BJQ operating from Wake Island would sign N8BJQ/KH9 or N8BJQ/NH9. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (W8, K8, etc.). Portable designators without numbers will be assigned a zero (Ø) after the second letter of the portable designator to form the prefix. Example: PA/N8BJQ would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes. **You may not make up your own prefix.**

(b) Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

VIII. Scoring (QSO Points):

1. Single Operator: (a) All Band score = total contact points from all bands multiplied by the number of different prefixes worked (prefix multiplier; prefixes are counted only once). (b) Single Band score = total contact points on the band entered multiplied by the number of different prefixes worked (prefix multiplier).

2. Multi Operator: Scoring is the same as Single Operator, All Band.

3. A station may be worked once on each band for QSO point credit. Prefix credit may be taken only once.

IX. QRP Section: Single Operator only. **Output power must not exceed 5 watts. You must note QRP in the header of your Cabrillo file**, or in the case of non-Cabrillo logs, on the summary sheet and state the actual maximum output power used for all claimed contacts. Results will be listed in a separate QRP section and certificates will be awarded to each top-scoring QRP station in the order indicated in Section XI.

X. Low Power Section: Single Operator only. **Output power must not exceed 100 watts.** You must indicate low power in the header of your Cabrillo file, or in the case of non-Cabrillo logs, on the summary sheet and state the actual maximum output power used for all claimed contacts. Results will be listed in a separate low power section and certificates will be awarded to each top-scoring low power station in the order indicated in Section XI.

XI Awards: Certificates will be awarded to the highest scoring station in each category listed under Section IV . . .

1. In every participating country.

2. In each call area of the United States, Canada, Australia, Japan, and Asiatic Russia.

All scores will be published. To be eligible for an award, a single operator

MFJ Small, high efficiency *Loop Tuners*™

Turns any wire loop into small, high efficiency multi-band transmitting loop antenna

Mount for PVC Cross Loop

MFJ-933 **$179.95**

MFJ-935B **$199.95**

MFJ-936B **$249.95**

Drape a wire around a bookcase or window and attach both ends to this new *MFJ Small Loop Tuner*™.

***It** instantly turns into a small, high efficiency multi-band transmitting loop antenna!*

You can operate 5.3 to 30 MHz with a full 150 Watts. No ground, radials or counterpoises needed.

The excellent performance of a high-efficiency small loop antenna is legendary and well proven by users all over the world.

You'll radiate a low angle DX signal that literally rivals full size dipoles and work incredible DX!

It's a very quiet receiving antenna -- you'll hardly notice static crashes. Its high-Q reduces QRM, overloading, harmonics.

It's perfect for apartments, antenna restricted areas and portable operation -- *it really gets out!*

New!

A 13 foot wire formed into a loop operates 30-20 Meters (4 foot for 17-10 M; 7 foot for 20-15 M; 28 foot for 60-40 M).

You can tune *any* shape loop -- circle, square, rectangle, *any* odd shape. A quarter wavelength wire shaped as a *circle* is the most efficient.

A given wire length covers about 1.5 to 1 frequency range (i.e. 7-10/18-28 MHz, etc.). Exact frequency coverage depends on wire length, loop shape, surroundings and height above ground.

Has MFJ low loss *Butterfly* loop tuning capacitor, no rotating contacts. *Easy-Carry* handle. Mount for PVC Cross on cover.

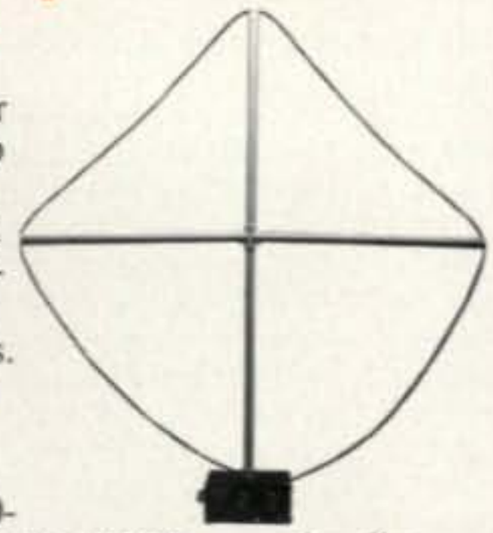
See June, 1986, *QST* or recent *ARRL Antenna Handbook* for more details on small, high efficiency loops.

MFJ-936B, $249.95. For home/portable stations. Has relative RF antenna current meter with sensitivity control and 30/300 Watts Cross-Needle SWR/Wattmeter. 10¼Wx5¼Hx9½D inches.

MFJ-935B, $199.95. For portable/home stations. Smaller, lighter. Relative RF current meter with sensitivity control. 6¼Wx5¼Hx9½D inches.

MFJ-933, $179.95. Same as MFJ-935B less RF current meter. 6¼Wx5¼Hx9½D in.

Wire Loops and Mounts



MFJ-57B, $29.95. Has PVC Cross for mounting loop on cover, 20-15M insulated 10-gauge flexible loop, low resistance lugs.

MFJ-58B, $49.95. Has MFJ-57B above, plus 60-40 M, 20-15 M, 17-10 M loops; wire clips.

Butterfly loop Tuning Capacitors

The heart of the *MFJ Loop Tuners* is an extremely *low loss butterfly tuning capacitor* with no rotating contacts. 4200 Volts RMS. ¼"dia.x2½" long shaft.

A. MFJ-19, $69.95. 12 to 67 pF. 6Dx3Wx3½H in.

B. MFJ-23, $89.95. 18 to 136 pF. 10Dx3Wx3½H in.

A. B.

Mini high-efficiency *Loop Tuner*™

New!

MFJ-932 **$99.95**

Tiny 50-Watt version of MFJ-933, *Small High-Efficiency Loop Tuner*™. Makes portable operation *really portable and fun*! Ultra low loss butterfly capacitor. Covers 80-10 Meters with appropriate wire loop. Tiny 3Wx4Hx1½D inches.

Whip Tuner/Artificial Ground gives *instant* 80-10M, 150 Watt Antenna

Just add short whip and counterpoise wire and *instantly* get an effective portable 150 Watt all band 3.5-30 MHz antenna.

It's effective, compact and simple to use for portable, fixed station and emergencies. New!

High power, hi-Q 3-core variable loading coil efficiently resonates short whip or random wire. Identical inductor tunes counterpoise. Operates 30-10 Meters with included 4½ foot telescoping whip antenna and counterpoise assembly.

Add longer whip/random wire and external loading coil for more efficient operation especially on 80-30M. 12 foot whip, hamstick, Hustler antennas all work great.

Tune for low SWR with built-in reversible L-network. *Current balun* decouples radiating elements.

Tune for maximum current on *RF Current Meter* to give you maximum radiated power and minimum SWR. Sensitivity control lets you use QRP to 150 Watts QRO.

Ultra low capacitance fiberglass antenna/counterpoise insulator minimizes shunting antenna current to ground for maximum radiated power.

Standard 3/8x24 female connector for whip antennas and wing-nut for counterpoise. SO-239. 7¼Wx2¼HX2½D inches.

MFJ-1642, $119.95. Like MFJ-1644 but less *RF Current Meter*.

MFJ-1644 **$149.95**

Window/Balcony 80-6 Meter Antenna, built-in *Tuner*

MFJ-1625 **$199.95**

New!

Complete antenna system mounts on window frame, balcony or railing. Perfect for apartment, condo. 80-6 Meters, 200 Watts. Universal mount/clamp, built-in antenna tuner with RF isolator, extra long 12 foot telescoping whip (22.5 inches collapsed), high efficiency loading coil for 40/80 Meters, counterpoise wires, safety rope. **MFJ-1623, $179.95.** Like MFJ-1625, but 6-30 Meters.

Telescoping Whips

10 and 12 foot long, standard 3/8x24 threaded stud. **MFJ-1954, $19.95.** 10 foot, 19" collapsed. **MFJ-1956, $29.95.** 12 foot, 22.5" collapsed.

Ruggedized flat Mobile/ portable SWR/Wattmeter

New!

MFJ-818 **$69.95**

MFJ's new flat, compact SWR/Wattmeter is *plenty rugged* to take the abuse of *brutal* mobile and portable operation.

Meter fully enclosed in strong aluminum case with just the scales and two small switches exposed -- there's little to break.

Simultaneously read SWR/forward/reflected power on full size 3-inch lighted *Cross-Needle* Meter. 30/300 Watt ranges, 1.8-30 MHz, SO-239 connectors. 5Wx3H x2D". Use 12 VDC for meter lamp or plug into cigarette lighter with **MFJ-5510, $6.95**.

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FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. ***Add shipping.***

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station must show a minimum of 12 hours of operation and multi-operator stations must show a minimum of 24 hours of operation.

A single-band log will be eligible for a single-band award only. If a log contains more than one band, it will be judged as an all-band entry unless specified otherwise.

In countries or sections where entries justify, second- and third-place awards will be made.

XII. Trophies, Plaques, and Donors:

SSB

Single Operator, All Band

WORLD – Stanley Cohen, W8QDQ
USA – Atilano de Oms, PY5EG
EUROPE – Jim Hoffman, N5FA
SOUTH AMERICA – Ron Moorefield, W8ILC
OCEANIA – Phillip Fraizer, K6ZM Memorial
AFRICA – Peter Sprengel, PY5CC
JAPAN – The DX Family Foundation
WORLD Low Power – Caribbean Contesting Consortium
USA Low Power – Terry Zivney, N4TZ
USA QRP/p – Doug Zwiebel, KR2Q
USA ZONE 4 High Power – Society of Midwest Contesters
USA ZONE 4 Low Power – Society of Midwest Contesters

Single Operator, Single Band

WORLD – Steve Merchant, K6AW
WORLD 28 MHz – Alan Dorhoffer, K2EEK Memorial
WORLD 7 MHz – William D. Johnson, KVØQ
USA 21 MHz – Bernie Welch, W8IMZ Memorial
USA 3.7 MHz – Lance Johnson Digital Graphics
USA 14 MHz Low Power – Boomer Contest Club

Multi-Operator, Single Transmitter

USA – Steve Bolia, N8BJQ
USA ZONE 4 – Society of Midwest Contesters
ASIA – W2MIG Memorial (NT4TT Sponsor)

Multi-Operator, Two Transmitter

WORLD – Doris Wong, AG1RL

Multi-Operator, Multi-Transmitter
WORLD – Gail Schieber, K2RED

Contest Expedition
WORLD – Kansas City DX Club

CW

Single Operator, All Band

WORLD – Steve Bolia, N8BJQ
USA – Dennis Motschenbacher, K7BV
EUROPE – Ivo Pezer, 5B4ADA/9A3A
OCEANIA – Tom Morton, K6CT
CANADA – Radio Amateurs of Canada (RAC)
JAPAN – The DX Family Foundation
WORLD Low Power – Caribbean Contesting Consortium
CANADA Low Power – Contest Club Ontario
USA LOW POWER – Terry Zivney, N4TZ
USA ZONE 3 High Power – Jim Pratt, N6IG
USA ZONE 4 High Power – Society of Midwest Contesters
USA ZONE 4 Low Power – Society of Midwest Contesters

Single Operator, Single Band

WORLD 7 MHz – William D. Johnson, KVØQ
WORLD 3.5 MHz – Lance Johnson Digital Graphics
USA – Kansas City DX Club
USA 28 MHz – Bernie Welch, W8IMZ Memorial
USA 21 MHz – Wayne Carroll, W4MPY

Multi-Operator, Single Transmitter

WORLD – Ron Blake, N4KE
ASIA – W2MIG Memorial (NT4TT Sponsor)
USA ZONE 4 – Society of Midwest Contesters

Multi-Operator, Multi-Transmitter

WORLD – Steve Merchant, K6AW

Contest Expedition

WORLD – Steve Bolia, N8BJQ

Combined SSB/CW

Single Operator, All Band

WORLD – Al Slater, G3FXB Memorial
Club (SSB & CW) – open
WORLD – CQ Magazine

A station winning a World trophy will not be considered for a sub-area award. That trophy will be awarded to the runner-up for that area if the returns justify the award.

XIII. Club Competition: A trophy will be awarded each year to the club that has the highest aggregate scores from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area (exception: DXpeditions specially organized for operation in the contest and manned by members). Indicate your club affiliation on the summary sheet or in the CABRILLO file. To be eligible for an award, a minimum of three logs must be received from a club.

XIV. Instructions for Submission of Logs:

(a) All times must be in GMT. All breaks must be clearly marked (not required for CABRILLO logs). Single operator and multi-single logs must be submitted in chronological order. Multi-Two logs must be submitted chronologically by station. Multi-multi logs must be submitted chronologically by band.

(b) All sent and received exchanges are to be logged. **Logs without sent and/or received serial numbers will be reclassified as checklogs**.

(c) Electronic submission of logs is the expected method for all participants. It is required for all top-scoring entrants, for anyone wishing to compete for an award, and for all who use a computer to log the contest or prepare contest logs.

(d) Instructions for CABRILLO logs—IMPORTANT CHANGES FOR 2006: Please put only your callsign in the Subject: field of the e-mail used to send your CABRILLO log. For U.S. & VE stations, please also indicate your ARRL Section in the CABRILLO header (*ARRL-SECTION*). All others use DX. The CABRILLO file format is the standard. Do not rely on your logging program; use a text editor (Wordpad, Notepad, DOS Edit—**no word processors**) to make sure all of the CABRILLO header information is there, including the extra line in the header for CATEGORY-OVERLAY if you are entering the TB-WIRES or ROOKIE categories. Also be sure to indicate your club affiliation. For detailed instructions on filling out the CABRILLO file header, see the WPX Contest website (http://www.cqwpx.com). Failure to fill out the header correctly can result in your entry being placed in the wrong category or reclassified as a checklog. Please do not mail printed copies of CABRILLO logs, as these are of no use to anyone. **Do not add any additional information to the log body. Comments such as DUPE, QSO points, or off times are not required.**

(e) E-mail is the expected method of log submission. SSB CABRILLO logs should be sent to <ssb@cqwpx.com> and CW CABRILLO logs should be sent to <cw@cqwpx.com>. All logs received via e-mail will be confirmed via e-mail. A listing of logs received can be found on the CQ WPX website at <http://www.cqwpx.com> and will be updated frequently.

(f) Instructions for NON-CABRILLO logs: If you are not able to submit a CABRILLO log, you may submit the ASCII output from most of the popular logging programs such as TR, CT, NA, Writelog, and SuperDuper. You may also submit the *.BIN, *.DAT, *.QDF files from CT, TR, or NA. If your log is not in CABRILLO format, a separate summary sheet is required. Please name your files with your call and the file type. Example: N8BJQ submits a CABRILLO file. It should be named N8BJQ.LOG. If N8BJQ chose to submit a non-CABRILLO file such as TR's .Dat file, he should name the log file N8BJQ.DAT and the summary file should be N8BJQ.SUM. See <www.cqwpx.com> for more information on e-mail log formats. Any logs sent on floppy disk should be on 3.5" diskettes and **sent in a proper mailer to prevent damage**. Non-CABRILLO Logs must be checked for duplicate contacts, correct QSO points, and prefix multipliers. Duplicate contacts must be clearly marked. An alpha/numeric check list of claimed PREFIX multipliers must be submitted with your log. Each non-CABRILLO entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the entrant's name and mailing address in BLOCK LETTERS. Also submit a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

(g) Official log and summary sheets are available from CQ Communications, Inc., 25 Newbridge Road, Hicksville, NY 11801 USA; fax (+1) 516-681-2926); or e-mail your request to CQ at <cq@cq-amateur-radio.com>. You may make your own forms as long as all required information is present.

XV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is judged by the WPX Contest Committee to contain an excessive number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he or she will be ineligible for any CQ contest awards for three years.

Declaration: By submitting an entry in the CQ WPX Contest you agree that you have read and understood the rules of the contest and agree to be bound by them, as well as all rules and regulations of your country which pertain to amateur radio. All actions and decisions of the WPX Contest Committee are official and final.

XIII. Deadline: All entries must be postmarked **NO LATER than May 1, 2006** for the **SSB** section and **NO LATER than July 1, 2006** for the **CW** section. All logs, including e-mail entries, are subject to these deadlines. Indicate SSB or CW on your envelope. Logs postmarked after the deadline may be listed in the results, but will be ineligible for any awards.

Check the WPX website <**http://www.cqwpx.com**> for instructions on mailing WPX logs. Questions pertaining to the WPX Contest may be mailed to WPX Contest Director, Steve Merchant, K6AW, 441 Palo Alto Ave., Mountain View, CA 94041 or via e-mail to <k6aw@cqwpx.com>.

AMERITRON . . . 800 Watts . . . $799!

More hams use Ameritron AL-811/H amplifiers than any other amplifier in the world!

Only the Ameritron AL-811H gives you four *fully neutralized* 811A transmitting tubes. You get absolute stability and superb performance on higher bands that can't be matched by un-neutralized tubes.

AL-811H
$799
Suggested Retail
4-Tubes, 800 Watts

AL-811
$649
Suggested Retail
3-Tubes, 600 Watts

You get a quiet desktop linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet -- no special wiring needed.

You get all HF band coverage (with license) -- including WARC and most MARS bands at 100% rated output. Ameritron's *Adapt-A-Volt*™ hi-silicon core power transformer has a special buck-boost winding that lets you compensate for high/low power line voltages.

You also get efficient full size heavy duty tank coils, slug tuned input coils, operate/standby switch, transmit LED, ALC, dual illuminated meters, QSK with optional QSK-5, pressurized cooling that you can hardly hear, full height computer grade filter capacitors and more. 13¾Wx8Hx16D inches.

AL-811, $649. Like AL-811H, but has three 811A tubes and 600 Watts output.

AMERITRON *no tune* Solid State Amplifiers

ALS-500M 500 Watt Mobile Amp

AL-500M
$799
Suggested Retail

500 Watts PEP/400W CW output, 1.5-22 MHz, instant bandswitching, no tuning, no warm-up. SWR, load fault, thermal overload protected. On/Off/Bypass switch. Remote on/off control. DC current meter. Extremely quiet, fan off until needed. Uses 13.8 VDC. Compact 9Wx3½Hx15D in., 7 lbs.

ALS-600 Station 600 Watt FET Amp

AL-600
$1299
Suggested Retail

***No tuning**, no fuss, no worries -- just turn on and operate.* 600 Watts PEP/500W CW, 1.5-22 MHz, instant bandswitching, SWR protected, extremely quiet, lighted Cross-Needle SWR/ Wattmeter, front panel ALC control. 120 or 220 VAC. Inrush protected. 9½Wx6Hx12D in.

AL-80B . . . Desktop Kilowatt 3-500G Amp

AL-80B
$1349
Suggested Retail

AL-80B kilowatt output *desktop* linear amplifier doubles your average SSB power output with high level RF processing using our exclusive *Dynamic ALC*™!

You get cooler operation because the AL-80B's exclusive *Instantaneous RF Bias*™ completely turns off the 3-500G tube between words and dots and dashes. Saves hundreds of watts wasted as heat for cooler operation and longer component life.

You get a full kilowatt PEP output from a whisper quiet desktop linear. Compact 15½Wx8½Hx14D inches. Plugs into your nearest 120 VAC outlet. Covers 160 to 15 Meters, including WARC and MARS (user modified for 10/12 Meters w/license).

You get 850 Watts output on CW, 500 Watts output on RTTY, an extra heavy duty power supply, genuine 3-500G tube, nearly 70% efficiency, tuned input, Pi/Pi-L output, inrush current protection, multi-voltage transformer, dual Cross-Needle meters, QSK compatability, two-year warranty, plus much, much more! Made in U.S.A.

Near Legal Limit ™ Amplifier

AL-572
$1445
Suggested Retail

New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *60%* of price of a full legal limit amp! 4 rugged 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 14½Wx 8½Hx15½D inches fits on desktop. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted cross-needle meters, multi-voltage transformer.

HF Amps with Eimac 3CX800A7

AL-800
$1825
Suggested Retail
1 tube, 1250 W

AL-800H
$2695
Suggested Retail
2 tubes, 1.5 kW *Plus*

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BY BOB JOSUWEIT,* WA3PZO

Lockdown!

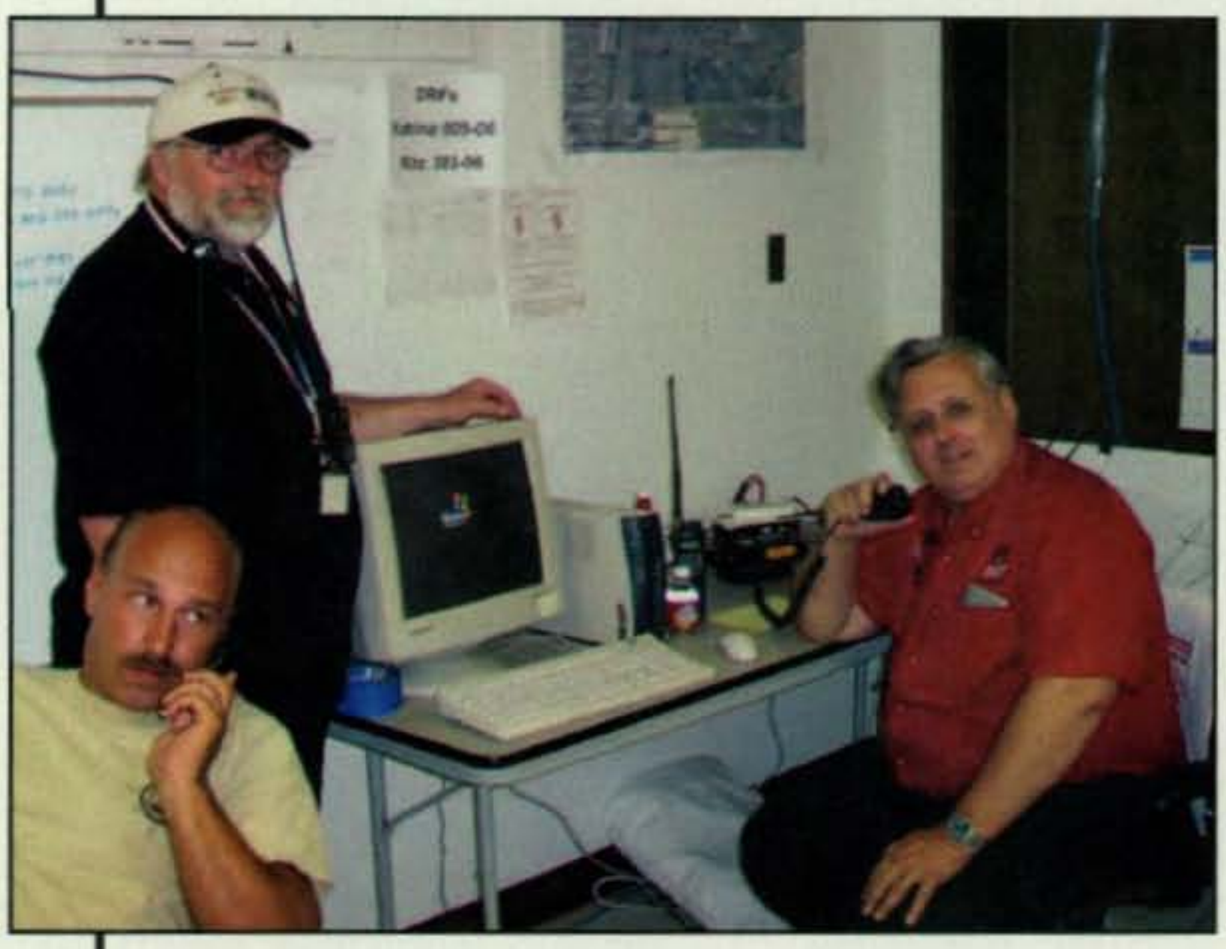
For the past two months we have focused on the work of amateur radio operators responding to "America's Tsunami"—Hurricane Katrina. This month we'll move to the Texas coast and the response to Hurricane Rita. We'll then move to Florida, a state with its share of experience responding to hurricanes, but which was surprised by Hurricane Wilma.

Rita—Highly Dangerous

Rita became the fifth most intense hurricane on record on September 21. It was a Category 5 storm with winds near 165 mph. The National Hurricane Center described the storm as "an extremely dangerous Category 5 hurricane." Rita's central pressure had fallen to 904 mb (millibars), or 26.69 inches. Just two weeks earlier Hurricane Katrina's pressure had been measured at 902 mb. Amateur radio operators along the Gulf Coast and throughout Texas began taking steps to prepare for this unwelcome visitor.

In Calhoun County, Texas amateurs were being requested to assist at the county emergency operations center. Local Amateur Radio Emergency Service officials stressed that "(a)nyone interested in going to the EOC *before* the storm arrives should understand and accept that this could be a *highly dangerous* assignment."

*c/o CQ magazine
e-mail: <wa3pzo@cq-amateur-radio.com>



Barry Hiddema, W5BLH, and Lee Besing, N5NTG (on microphone), at the Incident Command Post radio control station. Allen Shoults (South Texas K9 Search and Rescue) is the guy on the cell phone. Lists of current shelter activity are on the whiteboard behind Barry, and other maps on the wall show shelter locations at Kelly Airport and around San Antonio. (Photo courtesy of N5NTG)

Across the state of Texas, 64 counties would operate 255 total shelters, holding more than 33,000 occupants. Over 1000 single-family residences were destroyed, 4000 sustained major damage, and over 23,000 had minor damage. Over 1100 mobile homes were destroyed, with similar numbers having major or minor damage.

The Patients Just Kept Coming

Amateurs in the San Antonio area had just finished assisting the National Disaster Medical System with the movement of 13,600 Katrina evacuees to area shelters. These evacuees were transported on 88 flights designated as Federal Emergency Management Agency (FEMA) sorties. One official at the local Regional Medical Operations Center commented that the medical staff was starting to feel like Lucy Ricardo and Ethyl Mertz in the chocolate factory as the patients just kept coming.

As the remaining Katrina evacuees were moved to make room for the new Rita evacuees, Terri Thomas, KC5BJI, Bexar County Assistant Emergency Coordinator, listened to operations on the local repeater. As operators relayed head counts between the Red Cross headquarters, the incident command post, and multiple shelters, the numbers became staggering. On September 24 nearly 10,000 evacuees were moved in the county.

Communications Overloaded

While phone service was not a problem in most of San Antonio, cell phone service was taxed near many of the shelters. Temporary phone lines were installed into the Incident Command Post (ICP) and some of the shelter locations. Lee Besing, N5NTG, told *CQ* that cell phones were issued to the key personnel at various shelters. He asked, "But what happens when you have anywhere from 2000 to nearly 6000 or more evacuees in one close geographical location (i.e., a shelter) and those folks brought their own cell phones with them?" Nearby cell sites were overloaded. He said cell phone users found out that the network was busy, and phones lines were busy or just not working. Many of the temporary phone lines were strung up in a hurry. On the other hand, Besing said, "Ham radios always worked."

Besing was on duty at the Incident Command Post at 3 AM Saturday. This was the third day of ham operations in San Antonio. He explained that the Red Cross officials were trying to verify head counts at each shelter so that they could prepare the breakfast orders. Ham radio operators were not scheduled to report for duty at the shelters until 5 AM.

"One of the shelter managers had taken the assigned cell phone home with him when he went off shift at midnight, failing to call in to report a change in shift managers or their new cell phone number," said Besing. "After repeated calls to the shelter manager's cell phone to awaken him, he grumpily reported that he didn't know the cell phone of the current shift's manager, and that he

felt the assigned phone was for his personal Red Cross use, not a common phone assigned only to the shelter. At 5 AM, when the ham arrived, the first thing we asked all operators (was) to immediately contact their shelter managers to obtain current head counts for breakfast and the problem was resolved in the nick of time."

Besing described other situations in which Red Cross officials could not get in touch with shelter officials by cell phone. Either the lines were busy or the managers were busy and couldn't answer the phone, "but when the ham operator tapped them on the shoulder to pass a message and get a response, it was harder for the shelter manager to ignore."

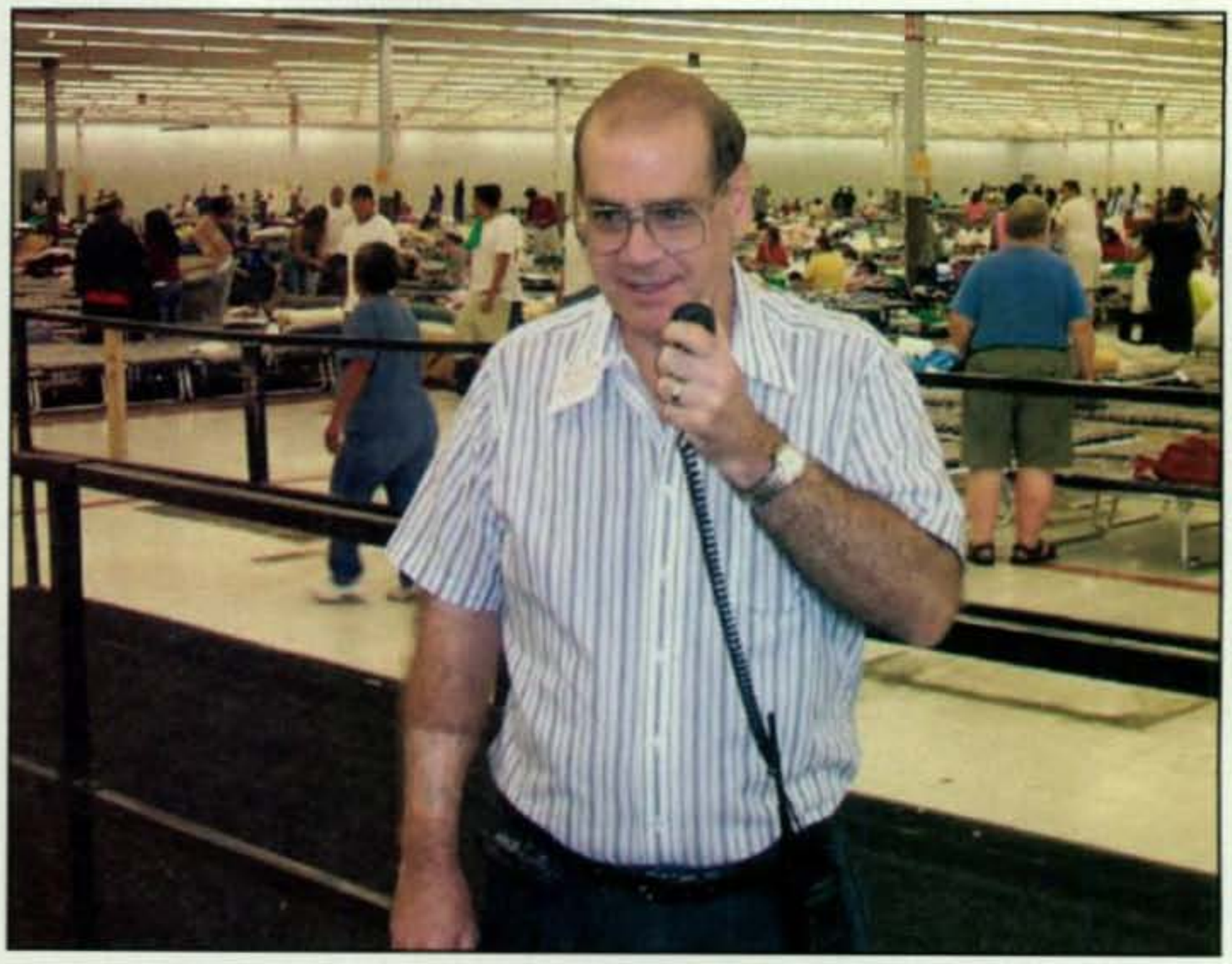
"There were a few hams," noted Besing, "who felt that the hams were not really needed, and thus our resources were being used by local authorities in a frivolous manner. What they didn't seem to understand was the concept of being prepared for a communications emergency, as compared to responding after the fact. Yes, phones were working for the most part in San Antonio, but in the shelters?? Sometimes that was a different story all together."

No Power, No Phones

In Jasper County, Texas, all 35,000 residents were still without power more than a week after Hurricane Rita hit. At least 230 transmission lines and 235 substations were out of service due to Rita's 120+ mph winds. Some estimates were that it would take three to five weeks to restore power in the town of Jasper. Generators continued to be the only power source there.

ARRL South Texas Section Emergency Coordinator Jerry Reimer, KK5CA, said that without electric power, "the amateur radio repeaters in the area are only usable when provided with an on-site generator, and constantly refueled, a daunting task where fuel is in short supply, as well as expensive."

Daily life was made difficult due to the complete lack of refrigeration, affecting both private residences and commercial facilities. Just to meet the basic nutrition needs of those in the devastated area, the Salvation Army and other organizations prepared and distributed food among many small towns in Jasper and adjacent counties. Amateur radio, primarily 40 meters SSB, was the only viable means to effectively coordinate the mobile canteens as they traveled out from the kitchen in Jasper. This allowed the prompt reporting of the number of



Stan Waghalter, KD5ZSY, operated at a Wal-Mart shelter where over 2100 evacuees were provided temporary food and housing. Behind him you can see the shelter operations. (Photo courtesy of N5NTG)

meals served at each site and town visited. It also identified areas where more people showed up than there was food available. Ideally, all five mobile canteens would be accompanied by an amateur radio operator. Unfortunately only three mobile HF operators were consistently available. The canteens without an operator had to return to Jasper to deliver their reports, greatly slowing the response time. As the food distribution situation stabilized, the need for amateur radio operators with each canteen decreased.

Lockdown!

After causing significant damage to Mexico, Hurricane Wilma made a right turn in the Gulf of Mexico and headed for southern Florida. Amateur radio operators were again preparing to welcome an unwelcome guest. WX4NHC, the amateur radio station at the National Hurricane Center in Miami, members of the Hurricane Watch Net, and many local and section nets made advance preparations. According to Julio Ripoll, WD4R, the National Hurricane Center made preparations to operate in a "Lockdown Mode" for the event.

Wilma approached the coast as a Category 2 storm. Ripoll said that "due to many unknowns that can affect the intensity of a hurricane before making landfall, it would be wise to prepare for a category higher than forecast. Since Wilma will be approaching from the west at a very fast speed, areas south of the eye will experience the additional forward speed to the sustained wind speed. The most severe storm surge and damage will occur to areas located south of the eye (southeast quadrant). The opposite of hurricanes making landfall from the east coast (northeast quadrant). After our recent experience with Hurricane Katrina, a Cat-1 over Miami, we understand that there is no such thing as a 'weak hurricane.' "

Max Mayfield, NHC Director, repeatedly reminds everyone, "Don't just look at the thin black line," referring to the track of the storm on maps. The hurricane-force winds were forecast to extend more than 70 miles from the center in all directions. Plus, there were many constantly changing atmospheric variables that affected the storm's track and strength. WX4NHC provided back-up communications from NHC using amateur radio to the National Weather Service and other governmental agencies. Since this was going to be a Florida event, the Hurricane Center made arrangements to stay in contact with the NWS and state agencies on 40 and 80 meters as well the Miami area on 2 meters.

Greater Damage

Hurricane Wilma made landfall early Monday, October 24 south of Naples, Florida. Greater damage occurred than

Amateur radio operators at the National Hurricane Center in Miami, as well as the rest of the NHC staff, were locked down as Hurricane Wilma passed over southern Florida. (Photo by Myra Kitchen, K3PGH)

Phil Jung, K9PJ, takes traffic at the Westgate Park shelter during Hurricane Wilma. Hurricane shelters are generally in schools, and the radio room is often in one of the administrative offices. The group used an indoor antenna because small antennas often get destroyed in the winds and school boards are reluctant to allow permanent antennas to be mounted on buildings. (Photo by Myra Kitchen, K3PGH)

was first expected due to the intensity of the storm remaining high as it progressed across the southern tip of the state. As conditions permitted, shelters were immediately set up in a number of counties, including Hardee, Collier, Broward, and Palm Beach. The three Florida ARRL Section Emergency Coordinators began working on a response plan to the extensive damage. According to information from the National Volunteer Organizations Active in Disaster (NVOAD), 31 shelters were set up, assisting 3771 people.

A call for 52 operators went out late Tuesday afternoon primarily to the three Florida sections, but the national resource AB2M website had again been set up for volunteers to register to help with communications needs caused by Wilma. It was reported the next morning that 22 people had been processed and were on their way to the area or soon would be. It was anticipated that more undoubtedly would be needed as more requests came in, as well as there being the need for relief operators.

Widespread power outages hampered relief efforts and generators were in demand. Southern Florida's ARRL Section Emergency Coordinator reported the amateur radio link between the Broward County Emergency Operations Center and Palm Beach distribution center had already proven invaluable to all involved and great appreciation was immediately expressed to the ham operators.

Training an Issue

Having to staff multiple locations proved to be an issue this time, even for an area that is hurricane prone. ARES leaders spent four days on the phone trying with limited success to recruit operators with the required Red Cross training. After advising the Red Cross of the low number of volunteers available, ARES officials were given a "waiver" to use the folks who had not yet taken the Red Cross training classes. This helped increase the number of volunteers available. By 9 AM Sunday, the Emergency Operations Center, Red Cross headquarters, and most of the shelters were up and running. By 1 PM the next day, the shelters were shut down and the amateur radio operators were released.

Individual Efforts

Throughout the hurricane season, amateur radio operators responded at a level to make us all proud. However, when reporting on such a big story, the experiences of individual operators are often lost. Here we'll take a moment to relay the story of one ham radio operator (another first-person story is in the sidebar "Amateur Radio Shines Brightly Through Storm Clouds"). It may not be the biggest story of the storm, but as with each individual who came out to help, it's an important one. Jan Heise, K4QD, supplied these comments to ARRL South Florida Section Manager Sherri Bower, W4STB:

We had a good trip down helping the Broward County EOC support Hurricane Wilma communications efforts. We took my 26-foot fifth-wheel camper-trailer with generator. We checked into EOC Thursday just before lunch. We spent Thursday afternoon at the Tamarac POD (distribution point) providing communications and helping distribute water. They got 33 palettes of ice and 66 palettes of water at noon on Thursday. By 2:00 PM all the ice was gone and by 4:30 PM all the water was gone. They blocked off a whole road by a community center and had people driving through in cars on one side and pedestrians lined up on the other side.

Thursday night we stayed at Challenger shelter, which was set up for volunteers. We had a total of six hams there. John and I put up a long-wire antenna. Friday we drove to two of the feeding units

to make sure they had communications and got the information back to EOC, because EOC could not contact them. We had a nice hot lunch with a Baptist feeding team from Texas. We were also able to get ten gallons of fuel at a FEMA distribution point. They limited us to ten gallons. While I waited about 30 minutes in line, John helped one of the law enforcement people who was a ham program his new ICOM mobile radio.

Late Friday we were deployed to Monarch HS Shelter where they did not have reliable communications. The ham who was there with his family had left to go home. They released us from there today after they had reliable cell phone communications. John and I used two of our J-pole antennas at the shelter. We had one on a PVC pipe strapped to a palm tree with the radio in the shelter office and the other mounted on my camper trailer parked in the faculty parking lot on the side of the building. That way we could monitor and operate from either position. We were able to get 110-VAC power at this location, so we did not need to run the generator here. We also put up my FB-5, five-band 20–10-meter portable antenna up on HF, so we operated some DX during the CQWW SSB contest.

We took 25 gallons of extra gas with us. There were long lines for gas everywhere. Going down, the amber alert sign on the turnpike before the service plaza said, "Gas limit $20. Estimated wait 6 hours." Cars were backed up on the turnpike to get into there. By the time we came back, there were only a few cars in line at the pumps on the turnpike, so things have improved greatly.

November Tornado Kills 22

Indiana Section Emergency Coordinator David Pifer, N9YNF, said amateur radio volunteers assisted in relief operations in the wake of a November 6 tornado that left 22 people dead and 200 injured. The tornado was an F3 on the Fujita scale with winds of up to 200 mph. According to news reports, the twister slashed a more *than 40-mile* swath through part of Kentucky and extreme southwestern Indiana in the early morning hours, wiping out a section of a trailer park in Vanderburgh County where 18 of the fatalities occurred.

"Amateur radio has been involved with various aspects of the response from the beginning," Pifer told the ARRL. The Salvation Army and the American Red Cross were also on the scene in the affected areas with canteen and mass-care facilities to feed and care for relief workers and tornado victims.

What a season...

Although there are still a few days left in the hurricane season as we go to press—and Tropical Depression 27 was threatening to become Tropical Storm Gamma—I think we can all say we've had enough. Yet as you read this issue, it's only six months until the start of the 2006 hurricane season on June 1. Are you prepared to assist when communications fail? Do you have the training required by state and local agencies? Now is the time to get prepared or fine-tune your training.

Our thanks to N5NTG, WD4R, W4STB, KC5BJI, KC5TYL, the Alamo Area Radio Organization, Inc., and the ARRL for providing information. Until next month . . .

73, Bob, WA3PZO

Amateur Radio Shines Brightly Through Storm Clouds

By James L. Lee, KC5TYL

Twice in a lifetime? Two of the most devastating hurricanes on record passed right over me. In 1969 Hurricane Camille tore through Lamar County, Mississippi, 60 miles north of Gulfport, with winds of 120 mph. Now Katrina, with 100-mph sustained winds and gusts to 120 mph.

The eye of Camille passed over us, and the eye of Katrina passed so close that we could see clear sky to the west, but this time the wind never stopped. This storm was so large that the rains reached us much sooner and had the ground saturated by the time the highest wind velocity arrived, resulting in much more damage.

My home is two miles off U.S Highway 11. It took me, my son Tyler, KD5LAI, and ten of our neighbors seven hours to cut our way out to the highway through heavily wooded timber company land that the public road passes. All communications were out, including my ham radio antennas.

When we finally finished with the road and I got in my pickup truck to head home, I heard our Lamar County Emergency Management Director, James Smith, on the repeater. He is not yet a licensed amateur, but the call was an emergency. I answered the call and was told, "We need ham operators at the E.O.C. now! We have no communications to the outside world and there is severe damage all around." Smith was asked if the roads to the E.O.C. were open and he advised they had been "cut out" or opened, barely. While rushing home, I tried to find other ops on VHF but couldn't. The storm was still blowing quite strongly. I checked on my family, cleaned off the chainsaw dust, changed clothes, and went to start passing radio traffic.

When I arrived at the EOC, it was like a recently stirred beehive, lots of activity. Going directly to the Operations room where our station was located, the equipment was checked. Everything was working and our HF and VHF/UHF antennas had withstood the storm well. Next, getting radio traffic needs was a priority. With list in hand from EOC personnel, I returned to the station and made contact with the Mississippi Emergency Management Agency (MEMA) in the state capital of Jackson.

Getting to the HF station, I tuned to the West Gulf ARES Emergency Net, which was in full swing. Permission was requested to make contacts with necessary stations, and after waiting my turn, I began ordering supplies needed by our relief agencies for our citizens. Our county had *no* power, *no* water, many impassible roads and streets due to downed trees, ambulances which could not get to patients, and so many other needs that no one can even begin to comprehend the devastation a storm like Katrina can cause.

The needs in my part of the state were so many that I passed traffic until my "tongue was hanging out," ordering bottled water, ice, outside law enforcement and fire fighters to allow our officers to get some rest, food, FEMA, Red Cross, tarpaulins to cover roofs where shingles had blown off or trees punched through, etc., etc. Many others were also using the West Gulf ARES Emergency Net and to hear the needs from New Orleans and the Mississippi Gulf Coast was gut-wrenching. Hundreds of thousands were in dire straits, and the pleas that could not be acted upon as well as the constant barrage of problems facing them has caused some emergency personnel to be in need of professional counseling from post-traumatic-shock.

A tremendously great help for us in passing traffic was the Pine Belt Repeater Coalition's repeater system. This four VHF repeater system allowed us to link repeaters from the Coast to the Capital, over 150 miles apart. These repeaters aided our area and most important, the Gulf coast of Mississippi, by allowing traffic to be passed directly to MEMA without waiting our turn on the HF net.

One of the Hattiesburg Area Amateur Radio Club's VHF repeaters was off the air due to the loss of power at the site. The club loaned it to the coastal counties, since they had only two repeaters usable for the whole Gulf Coast and we had enough on the air for our needs. Through his work as a broadcast engineer, Harold Stanton, N5GBR, secured permission to locate the K5PN (147.36 MHz) repeater and antenna very high on the WXXV Fox Television transmission tower at McHenry. This would cover most of the three coastal counties and 60 miles inland.

Those cities and counties that had a ham station were able to get relief supplies on the road much more quickly than those which didn't. Our citizens suffered, but not as much as others in our area did due to the fact that we had an ARES presence.

Our emergency management officers and county elected officials told our ARES ops that "the hams came through when we needed them" and that they couldn't have done their job without us.

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T200-96	96', 15 square feet	$2969
T300-88	88', 22 square feet	$2869
T400-80	80', 34 square feet	$2759
T500-72	72', 45 square feet	$2629
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2M12/2M5WL	$179/219
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440-470-5W/420-450-11	$149/105
432-9WL/432-13WLA	$189/255
440-18/440-21ATV	$135/159

M2 SATELLITE ANTENNAS

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3/16"EHS-500'/1/4"EHS-500'	$119/149

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HPTG6700I	$1.29/ft
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TX472, 72' Crankup Tower	$3139
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• MDP & MDPL models include motor drive

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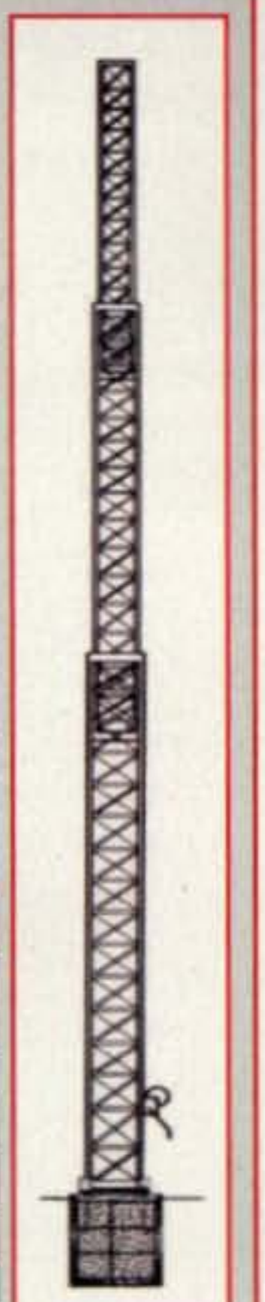
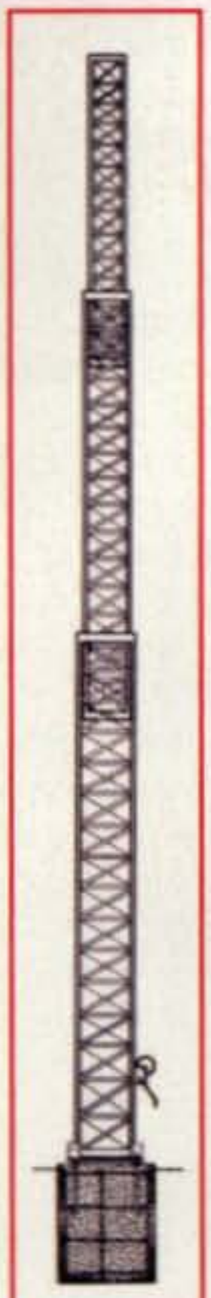
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TX-438	38'	21'6"	355	$1,523	$1,379
TX-455	55'	22'	670	$2,107	$1,899
TX-472	72'	22'8"	1040	$3,462	$3,139
TX-472MDP	72'	22'8"	1210	$5,571	$5,049
TX-489MDPL	89'	23'4"	1800	$9,034	$8,239





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• Heavy duty, handles 44.7 square feet of antenna load at 50 MPH, 35 square feet at 70 MPH.

• All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.

• MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

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HDX SERIES HEAVY DUTY CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
HDX-538	38'	21'6"	600	$1,807	$1,649
HDX-555	55'	22'	870	$3,162	$2,889
HDX-572MDPL	72'	22'8"	1600	$8,281	$7,549
HDX-589MDPL	89'	23'8"	2440	$10,841	$9,899
HDX-689MDPL	89'	23'8"	3450	$20,943	$19,129
HDX-5106MDPL	106'	24'8"	3700	$22,791	$20,799

MA SERIES CRANK-UP MASTS

• Handles up to 22 square feet of antenna load. (See chart below)

• MDP models include motor drive.

• All models supllied with anchor bolts, load-actuated hand winch, and house bracket.

• Options include coax arms, raising fixtures, motor drives, self-supporting and rotator bases, remote control panel, and more!

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MA SERIES CRANK-UP MASTS							
MAST MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	50 MPH (sq. ft.)	70 MPH (sq. ft.)	LIST PRICE	SALE PRICE
MA-40	40'	21'6"	242	16.5	6.8	$1,209	$1,099
MA-550	55'	22'1"	435	22	9	$1,875	$1,699
MA-550MDP	55'	22'1"	620	22	9	$3,584	$3,249
MA-770	71'	22'10"	645	15.5	5.5	$3,091	$2,799
MA-770MDP	71'	22'10"	830	15.5	5.5	$4,890	$4,449
MA-850MDP	85'	23'6"	1128	15.3	6.3	$6,591	$5,999

TMM SERIES COMPACT CRANK-UP TOWERS

• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

• Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.

• All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8' steel mast, top plate, and rotor plate.

• Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

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TMM SERIES COMPACT CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TMM-433SS	33'	11'4"	315	$1,626	$1,479
TMM-433HD	33'	11'4"	400	$1,970	$1,789
TMM-541SS	41'	12'	430	$2,135	$1,939

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math's notes

Oscilloscope Probe Potpourri

BY IRWIN MATH,* WA2NDM

As this is my first column of 2006, I would like to wish all of my loyal readers a very happy and healthy New Year. I sincerely hope that this is the year when all of those dreams and wishes you have had for so long really do come true. Remember, you never know what a new year (or tomorrow, for that matter) will bring!

Last month we described a 1-GHz+ X10 probe for a high-speed oscilloscope with a 50-ohm input (the Tektronix 7400 series with the 7A29 plug-in, for example). Since then we have come up with a simpler way to fabricate such a probe, as shown in fig. 1. If you choose to build it, you will be able to take full advantage of everything your scope has to offer in the area of bandwidth.

First we ordered an Emerson Network BNC to SMA jumper cable from Mouser Electronics (catalog number 5390-415-0028-036). Next we obtained a 1-inch length of 1/4-inch OD brass tubing (or a Mouser 534-1548B spacer) and three 150-ohm 1/4-watt carbon film resistors. We then soldered together the resistors in series and to the tip of the SMA plug. When you do this, try to keep any solder "blob" as small as possible and solder the resistors as close together as possible. Next slide a short piece of insulated tubing over the resistors to prevent shorts, and then slide the brass spacer over the resistors and into the SMA connector. If necessary, file the outside diameter of the spacer where it goes into the SMA connector so that you achieve a tight fit. If you happen to have a 1/4-36 die, you can thread the end of the spacer that goes into the SMA connector for an even better fit.

Now connect the assembly to an oscilloscope with a 50-ohm input. If you do not have such a scope, simply shunt the high-impedance input of the scope you do have with a 50-ohm resistor. The use of a BNC T connector (and coaxial 50-ohm load, if you have one) will make this easy (see fig. 2). Next con-

*c/o CQ magazine

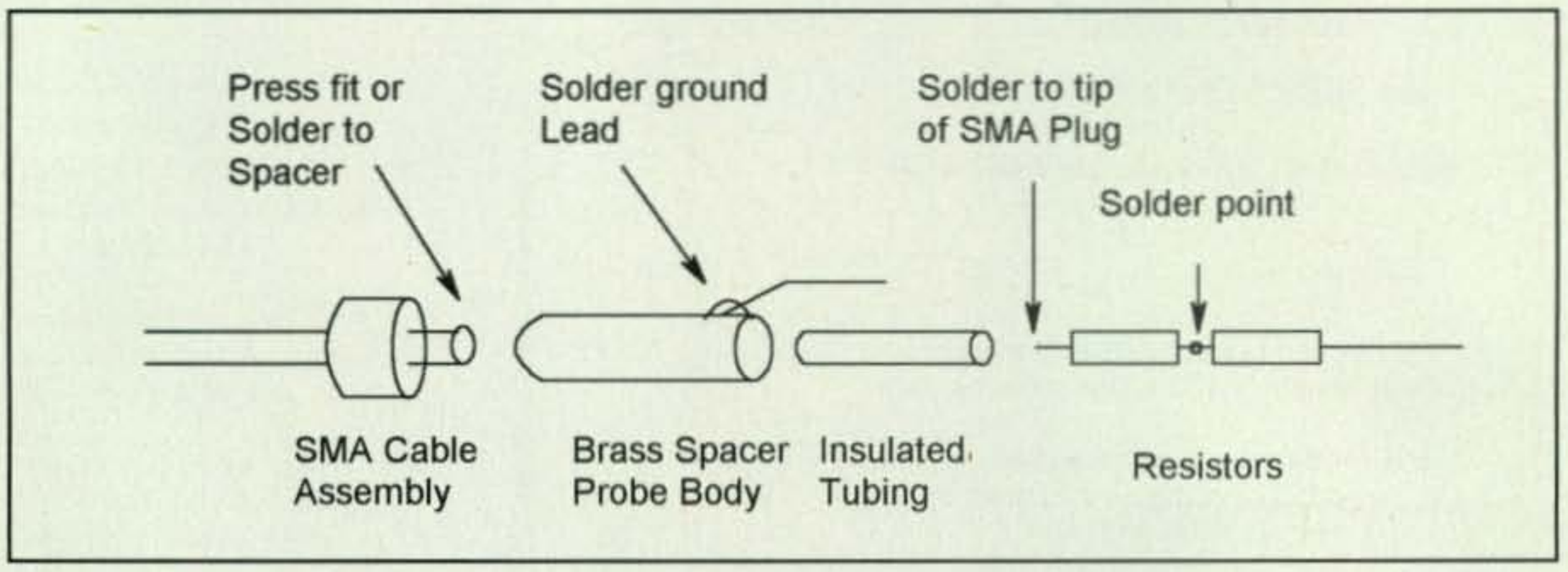

Fig. 1– Exploded view of high-frequency probe.

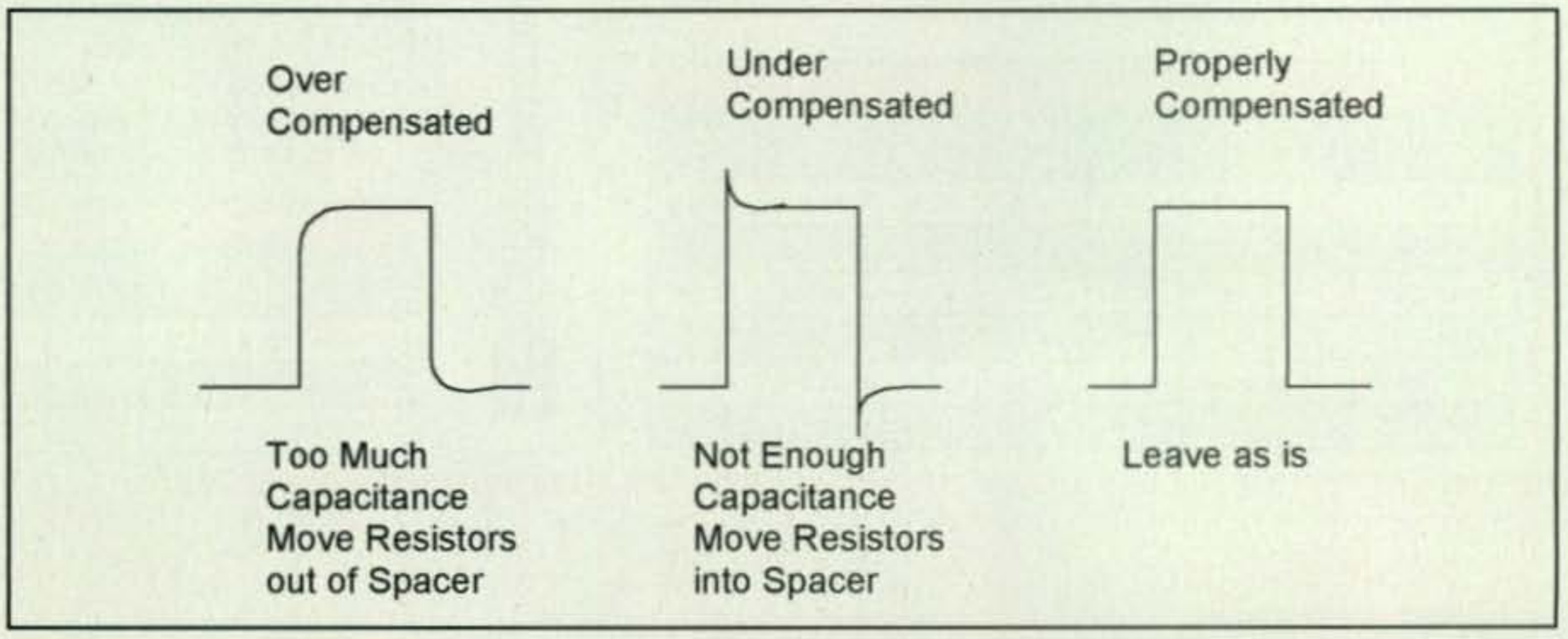

Fig. 2– Probe adjustment wave-shapes.

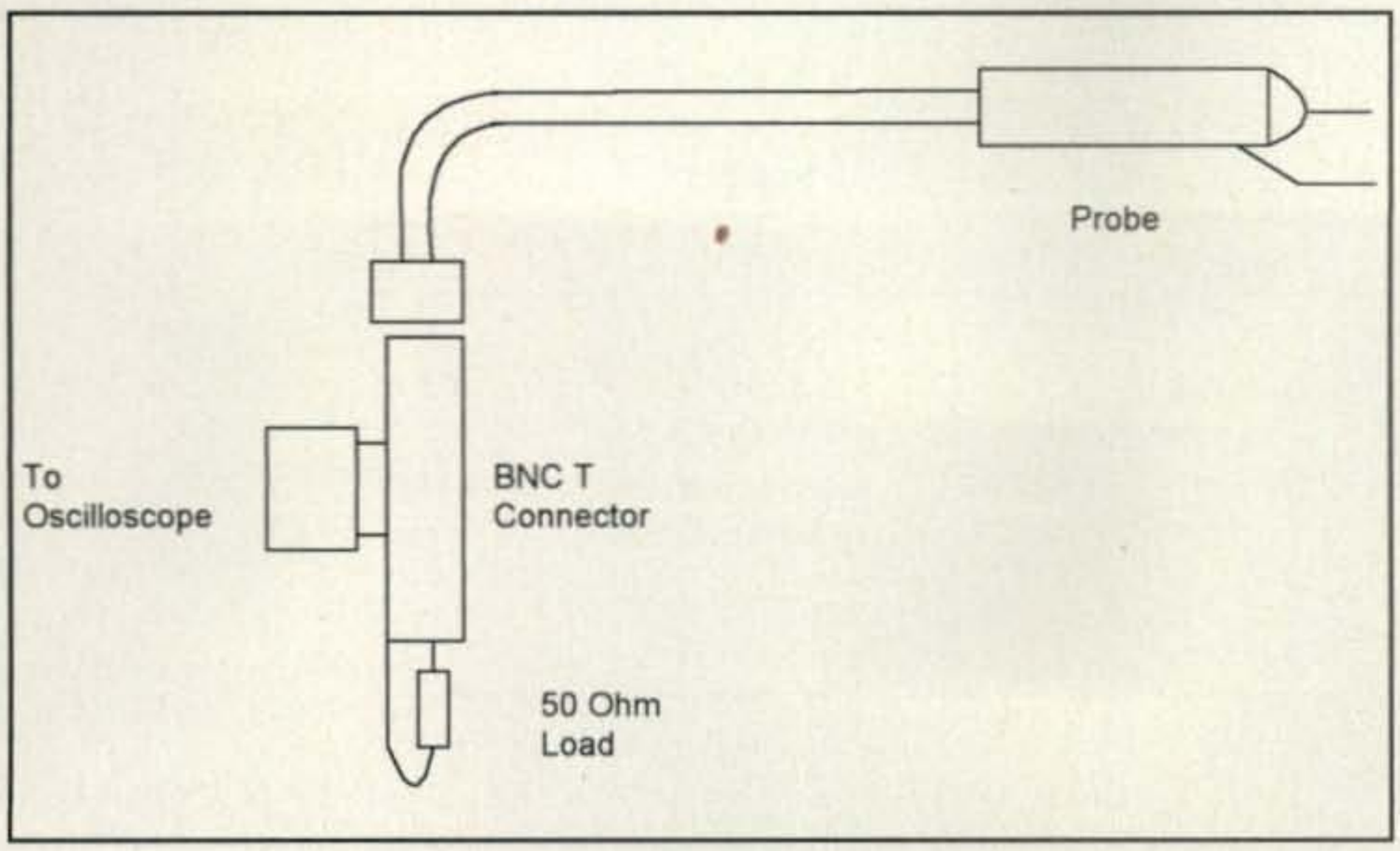

Fig. 3– Use of high-frequency probe with high-impedance scope.

nect a fast rise time (10 ns or better) square wave to the input of the probe. Note the overshoot on the scope trace. If there is none, no further work is required. If there is significant overshoot, either lengthen or shorten the spacing between the resistors that are covered by the spacer until the wave-shape is smooth. The more resistor within the tube, the more stray capacitance across the resistors and the greater the high-frequency roll-off. See fig. 3 for examples of the wave-shapes.

Finally, mix a small batch of epoxy and "plug" the opening where the free resistor string lead comes out. Shape the epoxy to get a round end (for cosmetic purposes) and the probe is complete. By the way, two such probes we built had a bandwidth that easily exceeded 1 GHz, and best of all, they cost less than $15 each! A ground lead for the probe is fabricated by soldering a short, stiff piece of bus wire to the body of the brass spacer (before assembly); this is also shown in fig. 2. Be sure to keep in mind that although the result is a true high-frequency probe, the final bandwidth will be determined by the bandwidth of your scope.

One final note: The probe described here has an input impedance of 500 ohms (450 ohms for the resistors and 50 ohms for the scope input), not the 1 megohm with which you may be familiar. In most RF circuits this will not be a problem. However, high-impedance stages may be loaded, so keep this in mind.

While on the subject of probes, fig. 4 is a schematic of an RF demodulator probe that you could use to examine the modulation envelope of an RF signal. Since the probe demodulates the RF, the bandwidth of the scope with which you use it only has to be high enough to pass the actual modulating frequency. You can vary the value of the filter capacitor to adjust the modulation response as well. The lower the capac-

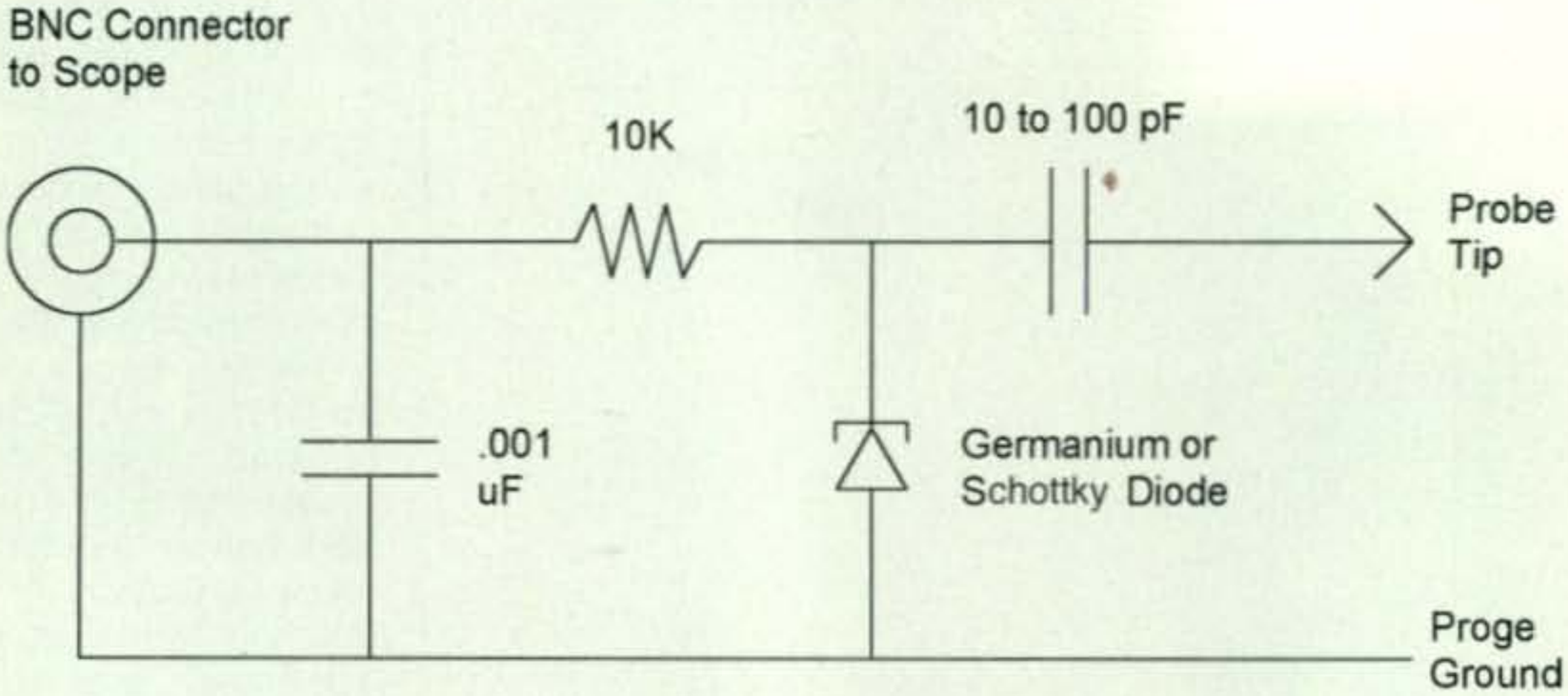

Fig. 4– Typical demodulator probe (see text for choice of values).

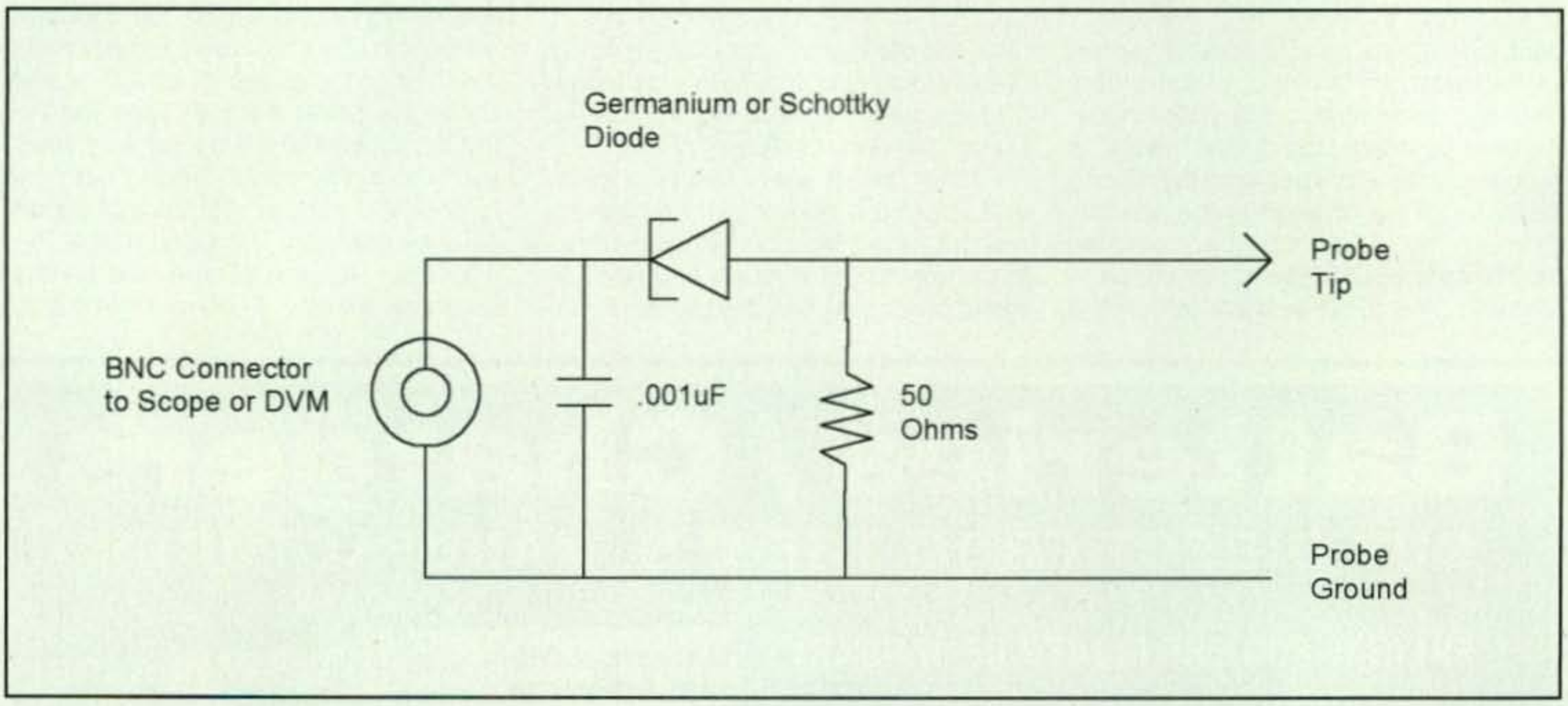

Fig. 5– RF power measuring probe. Wattage of 50-ohm resistor determines maximum power.

itance, the greater the probe's bandwidth. You can also choose the input capacitor to prevent loading on the circuit you are measuring. Use as small a capacitor value as possible here.

If you wish to measure actual RF power, simply modify the circuit as per fig. 5 and connect it to your DVM or the DC setting on your scope. The output will be a DC level that can be used to measure output power according to the following:

$$\text{RF Power} = (\text{Measured voltage} + \text{diode drop}/1.414)^2 /50$$

For a Schottky diode, use 0.35 volts for the diode drop. For a common silicon diode such as the 1N4148, use 0.7 volts. Overall accuracy usually will be in the area of about 10%, since the exact diode drops will vary from device to device. Also keep in mind that both the wattage of the 50-ohm resistor and the peak reverse voltage of the diode will determine the maximum power that can be handled by the circuit.

I hope the above shows the various types of accessory oscilloscope probes that can easily be built by the amateur. If you find RF experimenting interesting, you may find these of use in your various investigations.

On a closing note, I would like to thank all of you who wrote concerning my October column on electrical safety. One omission (pointed out by KA3YMK and others) was that the neutral wire and the actual earth ground must be physically connected together in the main breaker box. This is the only point where they should be connected. Also, the recent electrical code requires that in cases where plastic is used for water supply or a low-resistance ground is not available, a proper earth ground must be fabricated from at least two ground rods placed 6 feet apart. Regardless, remember that AC line voltage is dangerous and should be always be treated with care and respect. 73, Irwin, WA2NDM

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what's new

BY KARL T. THURBER, JR.,* W8FX

DJ-X7T Receiver, RB5000 Calibrator, SKYPOLE Support System, and more

This month we again shine *CQ*'s product spotlight on radio gear, shack accessories, antennas and antenna accessories, software, and more. Ready? Let's dig right in.

Radio Gear

Alinco® Introduces the DJ-X7T "Credit Card"-Size Wideband Communications Receiver. Alinco has announced a nifty, pocket-size wideband communications receiver intended to redefine the standard in miniature electronics technology.

"Alinco engineers have pioneered the standards for 'credit card'-size communications receivers with excellent audio. This new model builds on the success of the DJ-C7T, which is an amateur radio dual-band transceiver. In response to customer preferences, the DJ-X7T receiver offers five operating modes, three different antenna modes, triple-conversion AM/NFM plus double-conversion WFM—all in a size that is only a little larger than the average credit card," noted Russell Dudley, KW5O, President, Ham Distribution, Inc., North American distributor for Alinco. "It also features newly redesigned audio circuitry for noticeably improved sound quality."

The DJ-X7T (see photo A) receives 100 kHz to 1.3 GHz (with cellular frequencies blocked in the U.S.), and features 1000 memory channels which are easy to program using free software available for download from <http://www.alinco.com>.

The DJ-X7T weighs less than four ounces, and it operates using an included long-lasting lithium-ion battery. Also furnished is a standard adapter that charges the battery and operates the radio with AC power at the same time, so you can monitor frequencies even while charging. The new radio also comes standard with a large, easy-to-read, illuminated LCD screen, 39-tone tone squelch, auto power off, monitor/mute, cable-cloning capabilities, and priority receive.

Dudley adds, "Even with all the great features on this unit, the DJ-X7T will perhaps be best appreciated for its amazingly small size. At only 2.28" × 3.78" × 0.57", this receiver can fit comfortably in a pocket or purse and the affordable pricing will make it a very popular choice."

For more information and pricing, contact Alinco through its North American distributor, Ham Distribution, Inc., 15 South Trade Center Pkwy. #85, Conroe, TX 77385 (phone 936-271-3366; e-mail: <alinco@consolidated.net>; on the web: <http://www.alinco.com>).

Photo A– The Alinco DJ-X7T "Credit Card"-Size Wideband Communications Receiver receives 100 kHz to 1.3 GHz (with cellular frequencies blocked in the U.S.), and features 1000 easy-to-program memory channels. Details are in this month's column. (Photo courtesy of Alinco)

Accessories for the Shack

LINK Introduces Second Three-Position Ratcheting UniDriver® Locking Drive Tool. LINK® Tools, a global leader in hand tool innovation, has introduced a 3/8-inch drive three-position UniDriver®, which joins the company's earlier introduction of a solid-core 1/4-inch drive tool that connects at both ends. The new Ratcheting UniDriver (see photo B) is expected to have broad appeal.

"We fully expect the LINK Ratcheting UniDriver to become the most universal hand tool sold," said John Davidson, CEO of LINK Tools. Davidson added, "A LINK Tools UniDriver combines all the functions of a speeder, an extension bar, a screwdriver and a ratchet in one tool."

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

Photo B– The new all-metal Ratcheting UniDriver® from LINK® Tools is a key addition to any toolbox because of its solid metal core and its ability to ratchet in a clockwise or counter clockwise direction, or to be set to neutral. (Photo courtesy of LINK Tools)

Photo C– The Misty Hollow Enterprises RB5000 Calibrator is a high-accuracy marker generator that provides a simple and accurate way to calibrate any brand of vintage, classic, or contemporary gear. (Photo from the Misty Hollow Enterprises website)

The new, all-metal Ratcheting UniDriver is a key addition to any toolbox because of its solid metal core and its ability to ratchet in a clockwise or counter-clockwise direction, or to be set to neutral. The tool can loosen or tighten attachments rapidly, and there reportedly is no danger of dropped sockets damaging equipment.

When set in neutral, the LINK Ratcheting UniDriver can be used with a t-bar or ratchet wrench "plugged" into the top for greater torque. Free rotation of the solid shaft with the handle remaining in neutral means you can guide the tool by the handle, without any loss of torque while in use. This versatility in a single tool is said to result in significantly greater efficiency, safety, and economy.

The 3/8-inch drive and the 1/4-inch drive for Ratcheting UniDrivers retail for $54.99 and $44.99, respectively. Each can be used with any high-quality, branded socket. The Ratcheting UniDriver can be obtained with any of the LINK sets for a slight charge. LINK also offers a wide range of additional accessories.

Contact LINK Tools International, Inc., P.O. Box 14609, Chicago, IL 60614 (1-888-727-5465; e-mail: <jdavidson@linktools.com>; on the web: <http://www.linktools.com>).

RB5000 Calibrator© from Misty Hollow Enterprises. Several months ago in the column we profiled the firm's high-stability RB7500 Direct Digital Synthesis (DDS) VFO©, for use with the Drake TR-7 transceiver. We also noted that although the initial offering was for the Drake TR-7, models were being developed for other radios.

Now another intriguing new product is offered. The RB5000 Calibrator (photo C) is a high-accuracy marker generator that provides a simple and accurate way to calibrate HF radio receivers operating from 25 kHz to 100 MHz. A TCXO (Temperature Compensated Crystal Oscillator) and frequency divider chain provides harmonic-rich, switch-selectable outputs at 500, 250, 100, 50, and 25 kHz settings. A short wire "antenna" is connected to the RB5000 Calibrator RF output to couple the unit to the receiver.

The RB5000 Calibrator uses TCXO from the RB7500 series; has a frequency accuracy of 2.5 PPM (±9 Hz at 3.5 MHz or ± 75 Hz at 30 MHz); possesses switch selectable markers at 500 kHz, 250 kHz, 100 kHz, 50 kHz, or 25 kHz, being usable beyond 100 MHz; has an asymmetric waveform that provides odd and even harmonics; and offers an excellent way to calibrate receivers without digital readouts or to check radios that have digital readouts. The $69.95 unit

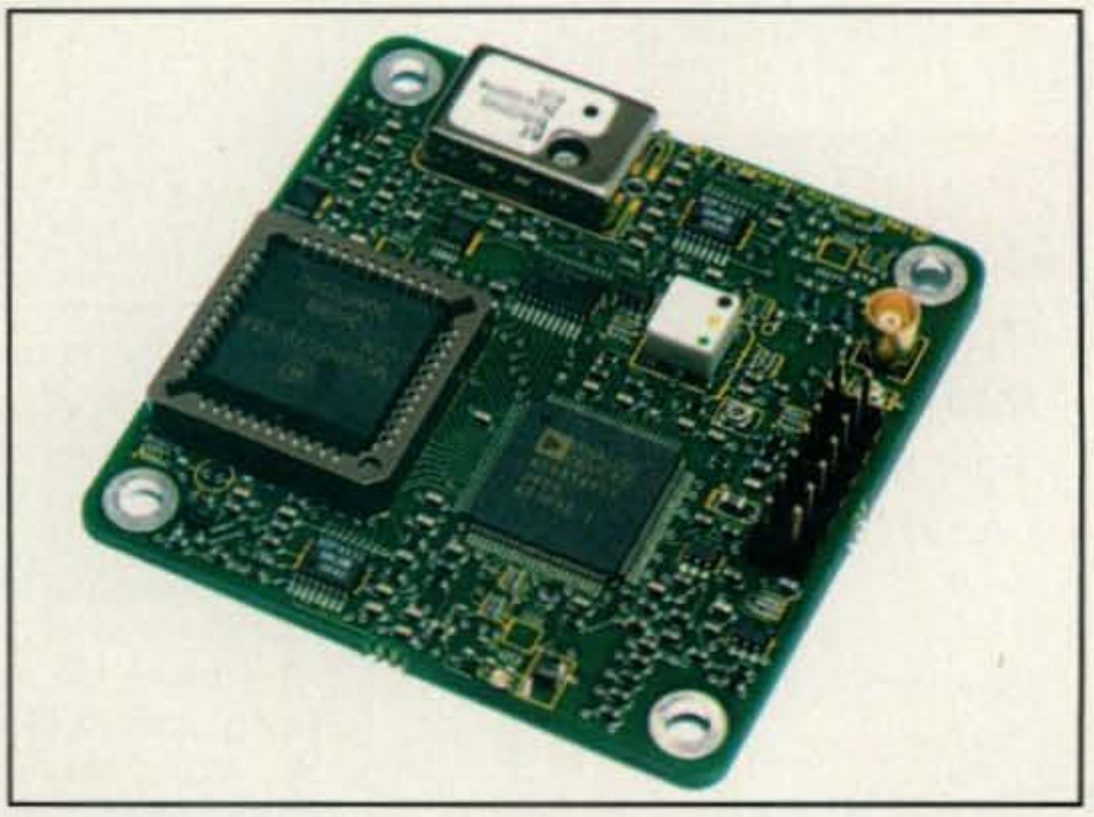

Photo D– Novatech Instruments has introduced another top-quality workbench instrument, the Model LPO400A 400-MHz Direct Digital Synthesized Locking Programming Oscillator, on a 60-mm-square circuit board module. (Photo courtesy of Novatech Instruments)

operates from five included "AA" cell batteries that mount inside the unit to provide 7.5 VDC.

For more information, or to place an order, contact Misty Hollow Enterprises at 1509 Derby Run, Carrollton, TX 75007 (phone 214-995-9691; e-mail: <navaids@tstar.net>; on the web: <http://www.mistyhollowenterprises.com>). Be sure to check the firm's website for new developments.

Novatech 400 MHz Locking Programming Oscillator. Novatech Instruments, Inc. has introduced another top-quality, high-end workbench instrument, the Model LPO400A 400 MHz Direct Digital Synthesized Locking Programming Oscillator (photo D) on a 60-mm square circuit board module. The new unit generates a sinewave or differential ECL (Emitter-Coupled Logic) output to 400 MHz with exact 1-Hz steps under serial control.

The Model LPO400A is equipped with a ±1.5 parts-per-million onboard clock which can be locked to a programmable external frequency standard or used independently. Requiring only a ±3.3-volt power source, the LPO400A is said to be ideal for embedded applications that require programmable frequency sources. Also, an LPO400A evaluation board kit (photo E) contains RS232 drivers, power supply,

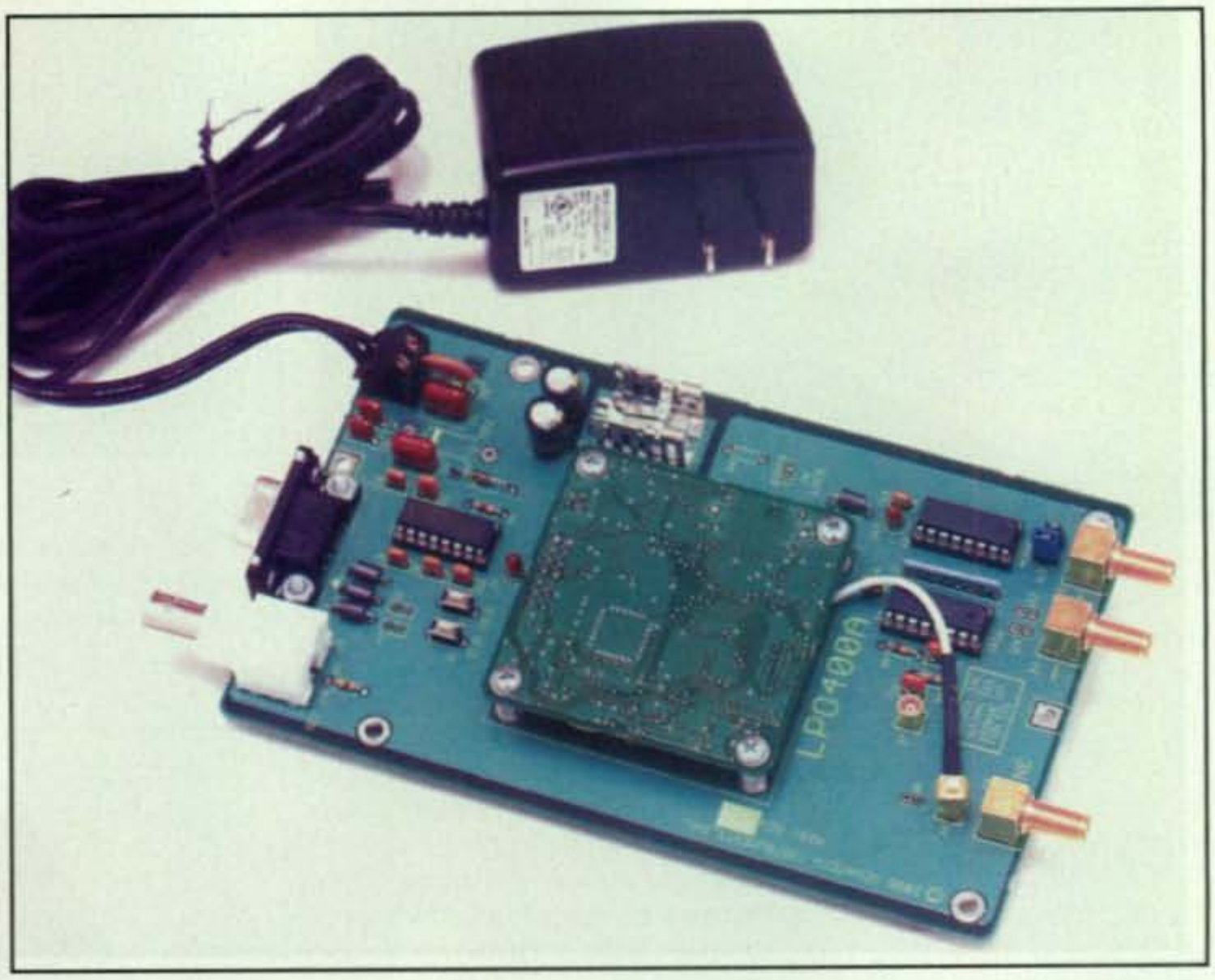

Photo E– The Novatech Instruments LPO400A evaluation board contains RS232 drivers, power supply, and connectors for simplified testing and programming. (Photo courtesy of Novatech Instruments)

and connectors for simplified testing and programming.

For more information and product pricing, contact Novatech Instruments, Inc., P.O. Box 55997, Seattle, WA 98155-0997 (206-301-8986; e-mail: <sales@novatech-instr.com>; web: <http://www.novatech-instr.com>).

Antennas and Accessories

Cubex SKYPOLE Portable Antenna Support System. Cubex Company has recently added the SKYPOLE to its extensive line of HF (40–10 meters), VHF and UHF quad antennas, and related accessories. The SKYPOLE (photo F) is a portable antenna support system that's said to be ideal for Field Day and expedition-style operations, one that's capable of supporting wire dipoles and small VHF antennas at heights of up to 40 feet. Larger arrays may be accommodated at lower heights where mast diameter is larger. According to Norman Alexander, W4QN, of Cubex, the system has been under development for some time and has

Photo F– The new SKYPOLE Portable Antenna Support System from Cubex Company is said to be ideal for Field Day and expedition-style operations. (Photo courtesy of Cubex Company)

Photo G– The Palstar AT-AUTO 1500-Watt Automatic Antenna Tuner features a power rating of 50–1500 watts, with high efficiency and low tuner losses. Find out more in this month's column. (Photo courtesy of Palstar)

been field tested in 2004 Field Day exercises in Florida, with very good results.

The SKYPOLE is comprised of a 2-inch aluminum pipe base section and five heavy duty 8-foot telescoping fiberglass sections. Stainless-steel pins to lock the telescoping sections, a swivel lanyard support, two guy attachment plates, "S" hooks, Dacron® polyester guy lines, and tensioners are included.

For the ultimate in setup convenience, there's an optional "Easy-Up" drive-on tilting and rotatable base plate. Simply pin the base plate to the ground with a tire of your vehicle; assemble and tilt up the mast with your antenna, feed line, and guy ropes installed; and secure the SKYPOLE in position with the guying system—and you're ready to operate!

A pivoting arrangement in the base plate allows you to manually rotate directional antennas, and—once the system is securely anchored—you can even move the vehicle off the base plate. Price, SKYPOLE and guying set: $225; "Easy-Up" base: $125.

For further information and to place orders, contact Cubex Company, 228 Hibiscus St. #9, Jupiter, FL 33458 (561-748-2830; e-mail: <CubexCo@cubex.com>; on the web: <http://www.cubex.com>).

Palstar AT-AUTO 1500 Watt Automatic Antenna Tuner. Hams have long realized the benefits of low-power autotuners, but now Palstar takes it to the next level and offers auto-tuning with a power rating of 1500 watts single-tone continuous power.

The new Palstar AT-AUTO 1500 Watt

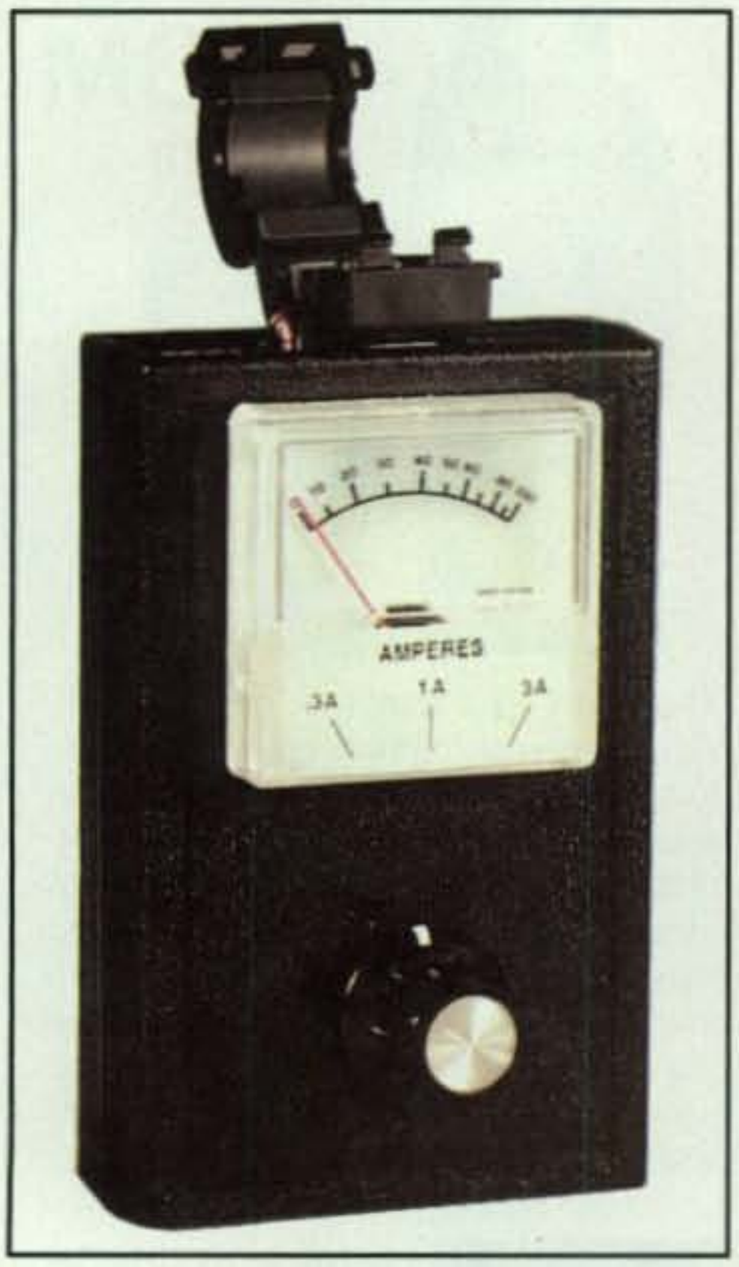

Photo H– This tiny MFJ-853 Clamp-On RF Current Meter is said to accurately measure RF current in antenna elements, ground wires, and coax shields. (Photo courtesy of MFJ Enterprises)

Photo J– The smiling gent on the left is CQ Advertising Manager Don Allen, W9CW, and next to him is your "What's New" columnist, Karl Thurber, W8FX. (Photo by Millie Thurber, KD4SHM)

Photo I– The handy MFJ-917 SWR Analyzer Current Balun conveniently lets you use your SWR and antenna analyzers on balanced-line antennas and other loads. (Photo courtesy of MFJ Enterprises)

Automatic Antenna Tuner (photo G) features a power rating of 50–1500 watts and low tuner losses. Tuning times are estimated at less than 6 seconds, using heavy-duty, processor controlled stepper motors. Data in/out is compatible with ICOM, Yaesu, Kenwood, and Ten-Tec radios. The unit has a two-line, large-print display to read the status of antenna feed, frequency, and 100 channels of memory.

Also, integrated into the AT-AUTO is Palstar's top-of-the-line PM2000A wattmeter, a $149 value, which allows you to measure and display forward power, reflected power, and SWR simultaneously. The meter can display either peak or average power readings, and it has 300- and 3000-watt range settings.

Palstar stands behind its products and offers a three-year limited warranty on the AT-AUTO and other selected products. For more information, or to order, contact Palstar, Inc., 9676 N. Looney Road, P.O. Box 1136, Piqua, Ohio 45356; (1-800-7737931; e-mail: <paul@palstar.com>; on the web: <http://www.palstar.com>).

MFJ Clamp-On RF Current Meter and SWR Analyzer Current Balun. MFJ recently has announced several new accessories. First up is the MFJ-853 Clamp-On RF Current Meter (photo H). The new meter is said to accurately measure RF current in antenna elements, ground wires, and coax shields. The MFJ-853, priced at $39.95, simply slips over mobile whips to tune for maximum current/radiation. The unit has 0.3-, 1-, and 3-amp ranges, and its non-metallic case minimizes field disturbance for accurate reading. It's tiny, too: just $2\frac{1}{4}$" W × $3\frac{3}{4}$" H × 1" D.

Next up is the MFJ-917 SWR Analyzer Current Balun (photo I). Priced at $19.95, the new 1:1 Current Balun lets you use your SWR and antenna analyzers on balanced-line antennas and other loads. Covering 1.8–30 MHz, it's designed to be a perfect accessory for the MFJ-249B, 259B, 269, and similar devices.

Also newly available from MFJ (but not depicted here) are two new SMA-to-BNC Adapters. The MFJ-7716, at $3.95 each, is a BNC male/SMA female adapter. The MFJ-7718, $3.95 each, is a SMA male/BNC female adapter.

All of these new products are protected by MFJ's famous No Matter What™ one-year limited warranty. Under the warranty, MFJ will repair or replace (at itsr option) your MFJ products no matter what for one complete year.

To place an order, obtain a free catalog, or find the name of your nearest MFJ dealer, contact MFJ Enterprises, Inc., 300 Industrial Park Rd., Starkville, MS 39759 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; web: <http://www.mfjenterprises.com>).

Software and Computers

Copernic Desktop Search Update. We noted several months ago the introduction of what Copernic claims to be revolutionary free software called Copernic Desktop Search™, or simply "CDS." Billed as "The Search Engine for Your PC," CDS was designed to bring

the power of a search engine to your PC and allow you to easily and instantly search files, e-mails, and e-mail attachments stored anywhere on your hard disk. Importantly, CDS has a streamlined and intuitive user interface that lets you perform sub-second searches of PDF and MP3 files, Microsoft® Word and Excel® files, PowerPoint® files, pictures, videos, contacts, your browser history, and even your bookmarks.

User acceptance of Copernic Desktop Search reportedly has been excellent, and honors include its being honored by *PC World* magazine with a 2005 World Class Award for Desktop Search Software. Now Copernic has introduced a new V1.6 to make it faster and easier to use (and by the time this appears in print it may have a higher version number). Features in the updated release include new Internet Explorer and Firefox browser toolbars for desktop and web searches; a completely redesigned deskbar category selection window for better usability; a new "Pause indexing when running on battery power" option for laptop users; a new shortcut key to open the application main window from any other application; and more.

Contact Copernic, 20 Cabot Boulevard, Suite 300, Mansfield, MA 02048 (fax 508-618-1290; e-mail: <sales@copernic.com>; on the web: <http://www.copernic.com>).

Short Bursts

"What's New" Column Contributors Always Welcome! Are you offering for sale a new product of interest to radio amateurs that you'd like to tell us about and share with *CQ* readers? Do let us know what you're up to. While a polished, professionally prepared new product announcement or formal press release would certainly be welcome, one isn't necessary for an announcement of your product to appear in our "What's New" column. We can help you along the way. You can contact the "What's New" column by e-mailing your columnist at <w8fx@cq-amateur-radio.com>.

Just be sure to carefully note our disclaimer, which you'll find at the tail end of each column, just after the "Wrap-Up." The disclaimer tells you that the column listings are not product reviews and don't constitute a product endorsement by *CQ* or your column editor. Thus, we typically report on new products, but we don't review them in the column.

Also, if you think your new product might be a good candidate for an advertisement in *CQ*, whether large or small, by all means contact *CQ*'s Advertising Manager, Don Allen, W9CW (photo J). You'll find that it's easy to advertise in *CQ*, and Don can help you develop a winning ad for your product. Contact Don at telephone 217-344-4570, fax 217-344-4575, or by e-mail at <ads@cq-amateur-radio.com>. We also should mention that Don wears a second hat as Advertising Manager of our sister publication, *CQ VHF* magazine.

Wrap-Up

That's all for this time, gang. Next time, more "What's New." See you then.

Overheard: I've found that the truly wise person is slow on choosing friends, and even slower in changing them.

73, Karl, W8FX

Note: *Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

antennas

BY KENT BRITAIN,* WA5VJB

Getting Sirius . . . and a Look at the Buckmaster Off-Center-Fed Dipole

Whoops. Got it backwards last time, which is really embarrassing, since I have set up antennas for both XM and Sirius systems. It's XM with two satellites in geostationary orbit and Sirius with three birds in highly elliptical orbits. It was an XM antenna last time, so how about a Sirius this month? Of course, there are always plenty of amateur uses for these antennas as well, and it's just plain interesting to see how they work.

Photo A shows a Sirius antenna with a mount intended for home or business use. The mount is for a fixed angle looking towards the southern sky. A –3-dB beam width is going to be about ±45 degrees, both left/right and up/down.

Inside (photo B), we see a patch antenna with trimmed-off corners. Trimming off the opposite corners like that makes the patch circularly polarized. Underneath the patch is an H-shaped slot. It is that slot that excites the patch. In the HF world, this would be like mounting a dipole just under a five-element beam and using the dipole to excite the beam without actually having coax going to a driven element on that five-element beam. This perhaps is not my best analogy, but aperture-coupled patch antennas work well and are the basic element in most cell-site antenna arrays as well as in these satellite antennas.

Those 2.320-GHz signals coming down 23,000 miles from the satellite are pretty weak, so a very sensitive or low-noise receiver system is necessary (photo C). The loss in even a few feet of thin coax would be a killer. Thus, the first amplifier is mounted with the antenna, and power for the amplifier is sent up the coax. Many GPS (Global Positioning System) antennas are also built this way. It's a great system, but rarely used in ham antennas. That's because we usually like to transmit, and switching out an internal amplifier like that one is complex.

Photo A– Sirius satellite antenna and mount.

Photo B– The 2.32-GHz circularly polarized patch and slot inside the Sirius antenna.

The Buckmaster Off-Center-Fed Dipole

If you feed a dipole in the very center, and it's a fair distance off the ground, the feed impedance will be near 72 ohms. Bend the ends down, and the impedance will approach 50 ohms. That's where we get the inverted-V dipole, a very popular HF antenna. Now let's go up in frequency—second, third, fourth harmonic-type stuff. The dipole will still resonate on these harmonics, but the impedance is usually much higher than 50 ohms, especially on the even harmonics. This high impedance shows up as a high SWR.

Then again, who says you have to feed a dipole in the middle? When you feed the dipole in the middle, the impedance is near 72 ohms. However, if you start sliding the feed point towards one end, the impedance rises (see fig. 1). At the end, impedance varies with the diameter of the wire, but 1000 ohms is typical. The very center of a dipole is a voltage null, so as you move away from the center, a balun is necessary to keep the coax from becoming part of the antenna. You can build your own or you can purchase one commercially if you don't want to experiment with finding the right resonance points. I decided to take a Buckmaster Off-Center-Fed (OCF) dipole out for a test drive (photo D).[1]

I mounted the Buckmaster OCF on my crank-up/foldover tower (photo E). Normally this tower is

*1626 Vineyard, Grand Prairie, TX 75052
e-mail: <wa5vjb@cq-amateur-radio.com>

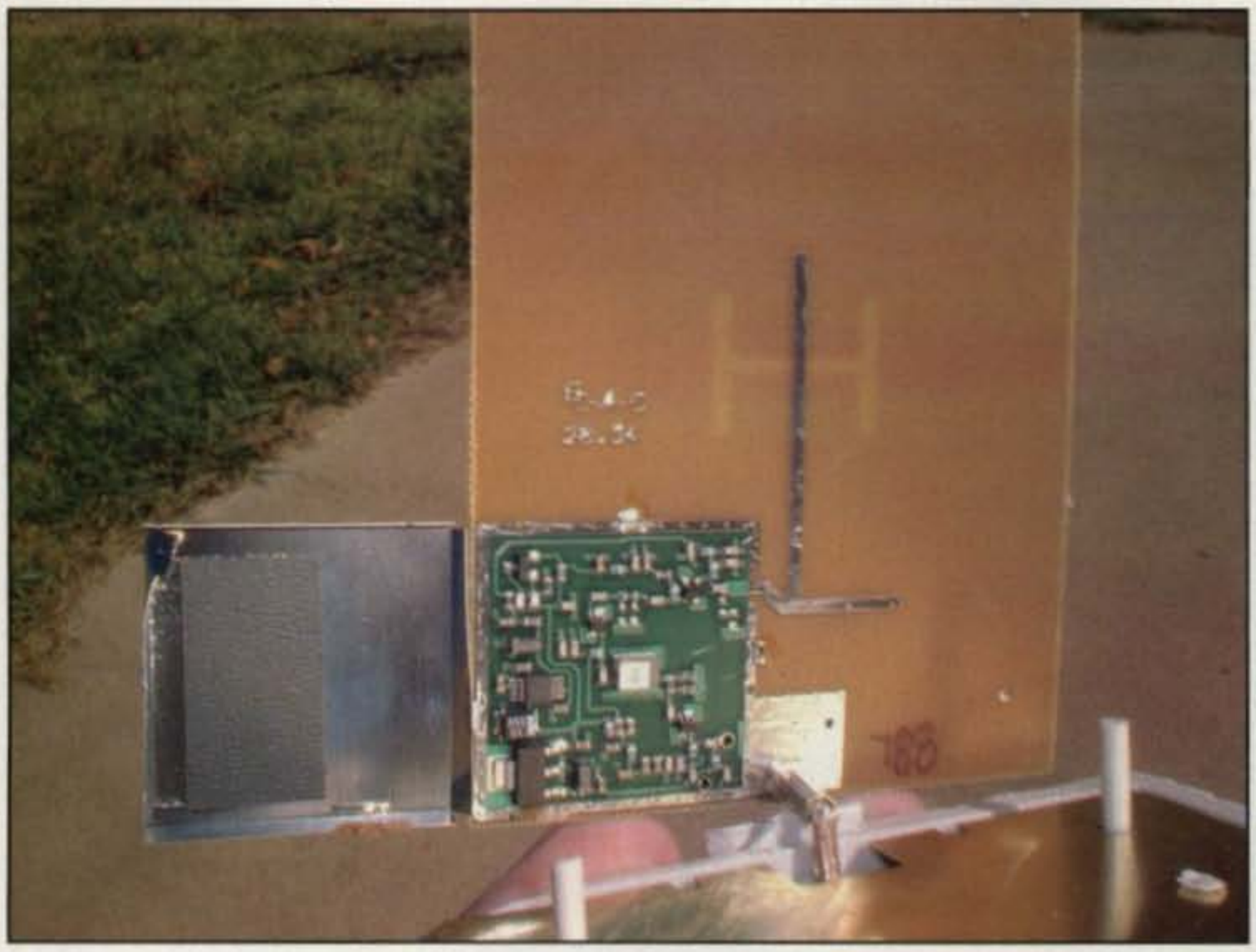

Photo C– The low-noise preamp and the 50-ohm line that couples to the slot.

Band	SWR	Return Loss
80	1.4	–15 dB
40	1.4	–15 dB
30	4	–4 dB
20	<1.2	>–20 dB
17	1.3	–16 dB
15	6	–3 dB
12	1.7	–11 dB
10	3.5	–5 dB

Table I– Results of return loss tracking for the Buckmaster OCF Dipole.

used for testing TV antennas, but it worked out well for this test. Also, that's not regular coax going up to the OCF antenna. You old timers can grin, as I didn't spot them a single dB. That's 3/8-inch hardline going up to the antenna! (If you use a long run of lossy coax, even a paper clip can have a great SWR on 160 meters. Let's say a long run of RG-58 loses half the power before it even gets to the antenna. The reflected power has to go through the same coax again, and loses half of the half that got though. Therefore, only half of half, or one quarter, of the power gets back to the SWR meter. You see about a 3 to 1 worsT-case SWR no matter what antenna is used.)

When an antenna is operated on its even harmonics, these higher-order resonances are much higher than 50 ohms. Offsetting the feed point helps match these higher impedances. However, since the antenna is offset, it really needs a balun, and by using a 4-to-1, or better yet a 6-to-1 balun, as Buckmaster uses, the offset dipole is being fed at 300 ohms instead of 50 ohms. Oh, I can just see the flame mail from the Windom antenna users. The Windom antenna makes the feedline part of the antenna; you want the feedline to radiate, OK!

Jack Speer at Buckmaster recommended getting the ends of the antenna a bit higher than my mesquite tree permitted, but my return-loss/SWR plot

Photo D– The Buckmaster OCF HF antenna.

Photo E– Testing the Buckmaster OCF HF antenna.

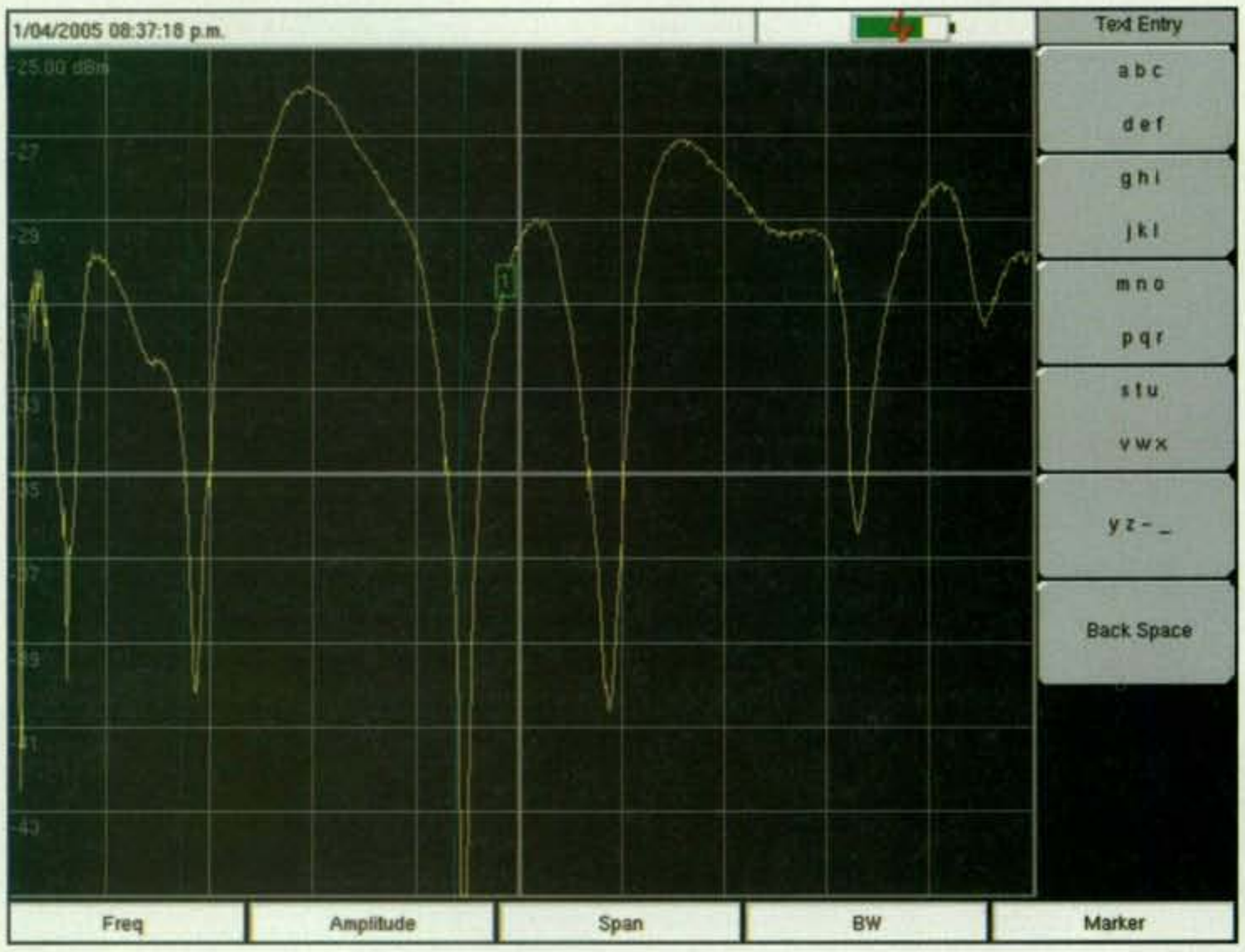

Photo F– The 2- to 30-MHz return loss plot of the Buckmaster OCF antenna

was similar to the manufacturer's claims (photo F).

The spectrum analyzer I was using didn't have a tracking generator, so I used the Ramsey signal generator to send a signal up to the OCF antenna. The spectrum analyzer was connected to a return-loss bridge and left in the "Peak Hold" mode. I just slowly tuned the Ramsey generator from 2 to 30 MHz, and the spectrum analyzer plotted out the reflected energy. Yes, I adjusted the top line on the scale for 0 dB return loss. You can see my results in Table I.

The SWR wasn't too hot on 30 and 15 meters, and the instructions do recommend using an antenna tuner on those bands. Ten meters was marginal[2], but getting the antenna a little higher would have helped, and a quick tweak with the antenna tuner would flatten that out. All in all, though, it's amazing that just two carefully selected lengths of wire can work that well on five bands.

For more information on the Buckmaster OCF Dipole Antenna, visit the Buckmaster webpage at <http://www.buck.com> or call 540-894-5777.

Reader Mailbag

From Arin we have a question on why his surplus antenna came with "Antenna Factors."

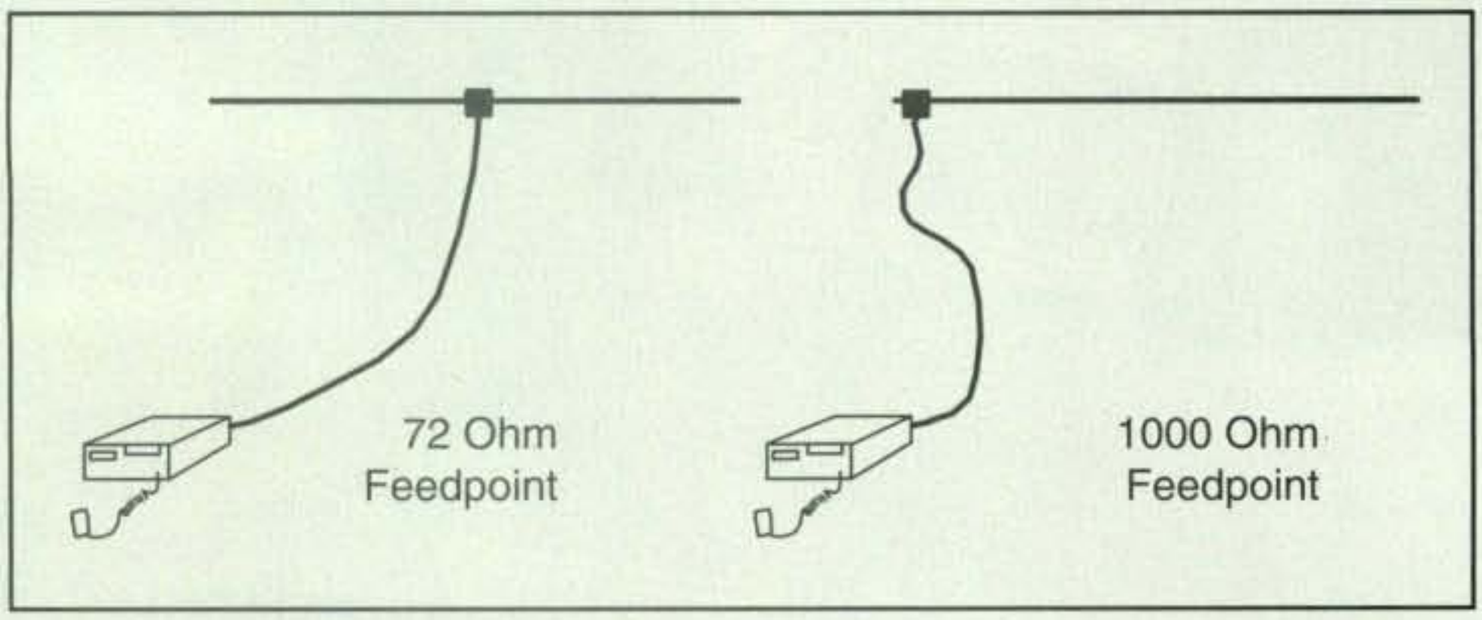

Fig. 1– Feedpoint impedance of a dipole antenna varies with the location of the feedpoint, from approximately 72 ohms at the center to approximately 1000 ohms at the end. An off-center feed (OCF) dipole gives you added flexibility for certain circumstances, as explained in the text.

20-meter dipole	–8.8
6-meter dipole	2.2
2-meter dipole	11.5
5-element 2-meter beam	3.6
5-element 440-MHz beam	13.2
18-inch satellite dish at 11 GHz	19.0

Table II– Some typical antenna factors.

Arin, it sounds like you came across a surplus EMI antenna, or one that had been used to measure field strengths. Whole chapters have been written on this subject, but *antenna factor* is a way of expressing the *capture area* of an antenna. You've seen where signal levels of TV stations or satellite footprints were measured in µV/square meter. To make such a measurement, you first need to know the signal power. A power meter, field-strength meter, or spectrum analyzer will work nicely. Next you need to know just how much of a square meter your antenna represents. That is the antenna factor. If the antenna has an antenna factor of, say, 10, then it represents 1/10 of a square meter and you have to multiply your power readings by a factor of 10. Some typical antenna factors are listed in Table II.

Examples of antennas that might have an antenna factor of zero are a 40-MHz dipole or an about 15-element 2-meter beam. Antenna factor is a pure number—no dBs or anything.

Neat Ideas Wanted

I have always gotten some of my best ideas for articles from you, our readers. How about going to the next level? Do you have any neat ideas you would like to share with other readers? A trick for grounding a mobile vertical? A simple way of attaching a coax connector? Or using something unusual to build your antenna? Let me know, and we'll make a short topic out of it in a future column.

Notes

1. These antennas are now also custom-made for Alpha Delta Communications, Inc. (Model DX-OCF). See <http://www.alphadeltacom.com/> for details.

2. In independent tests, both Buckmaster and Alpha Delta have found the SWR on 10 meters to be below 2 to 1 across the band. As Kent notes, his reading may have been influenced by his antenna's height above the ground.

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SS-12	10	12	1⅛ x 6 x 9	3.4
SS-18	15	18	1⅛ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅛	4.2
SS-30	25	30	3¾ x 7 x 9⅛	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅛	4.2
SS-30M*	25	30	3¾ x 7 x 9⅛	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅛	6.5
SRM-30	25	30	3½ x 19 x 9⅛	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅛	6.5
SRM-30M	25	30	3½ x 19 x 9⅛	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30-2	25	30	3½ x 19 x 9⅛	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅛	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

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SS-18GX
SS-12EFJ
SS-18EFJ
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SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

how it works

BY DAVE INGRAM,* K4TWJ

Vacuum Tubes Revisited

While discussing various topics with column readers and newer amateurs in particular, we noted several requests to revisit vacuum tubes and go over the concept of their operation in simple terms. The requests may seem slightly unusual to more "seasoned" amateurs, but bear in mind that those younger people who recently joined our ranks grew up using only transistors and thus find vacuum tubes complex and their associated high voltages frightfully intimidating. Does that make sense? Sure. Experimenting with transistors while using a single 9-volt battery for power is easy and safe, but dinking with vacuum tubes and accidentally getting "bit" by a healthy amount of plate voltage can be a shocking experience. There is nothing like the big-time radio excitement and rich, full-bodied sounds produced by vacuum tubes to make life grand! You just learn to respect and avoid a tube's high voltage (one good exposure usually does the trick) and enjoy the results!

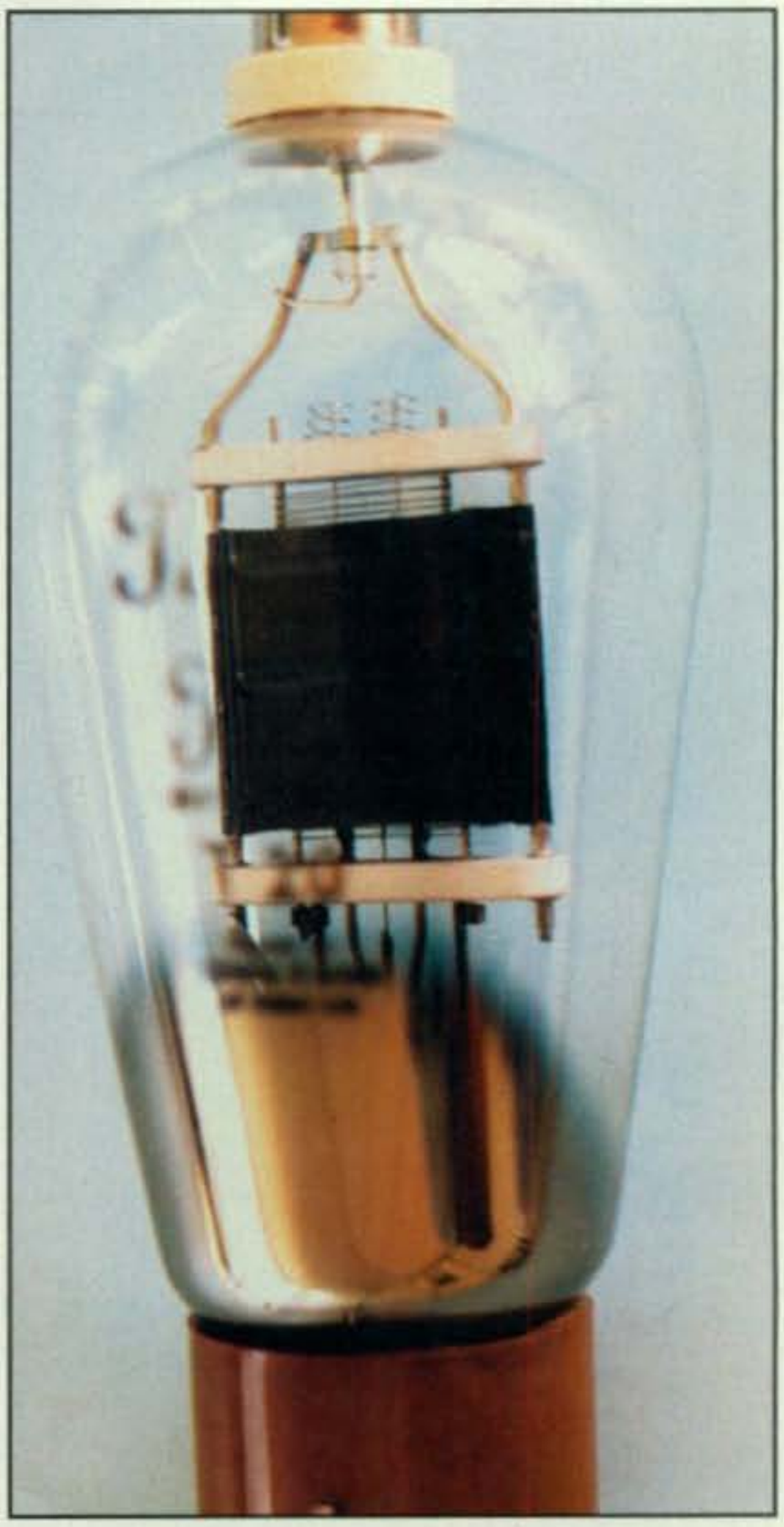

Photo A (top right)– Study this close-up view of a triode vacuum tube using fig. 1 for reference, and you can see how the tube's inner filament (visible as two spiral wires above the top ceramic support) is surrounded by a fine-wire grid, which in turn is surrounded by a dark metallic plate. Electrons emitted from the hot filament pass through the grid (which varies the electrons' flow through the tube's vacuum) to reach the plate. This particular tube operates with 1000 volts lurking at its plate cap and can produce a tooth-rattling shock if accidentally touched during operation.

Tubes vs. Transistors

As you may recall from studying for your ham license, vacuum tubes work on the principles of thermonic emission and controlling the flow of electrons within a vacuum. As you also may recall, there are two types of tubes. There are directly heated tubes in which a hot filament gives off or emits electrons, and there are indirectly heated tubes in which an electron-emitting cathode is wrapped around the hot filament. A high voltage is

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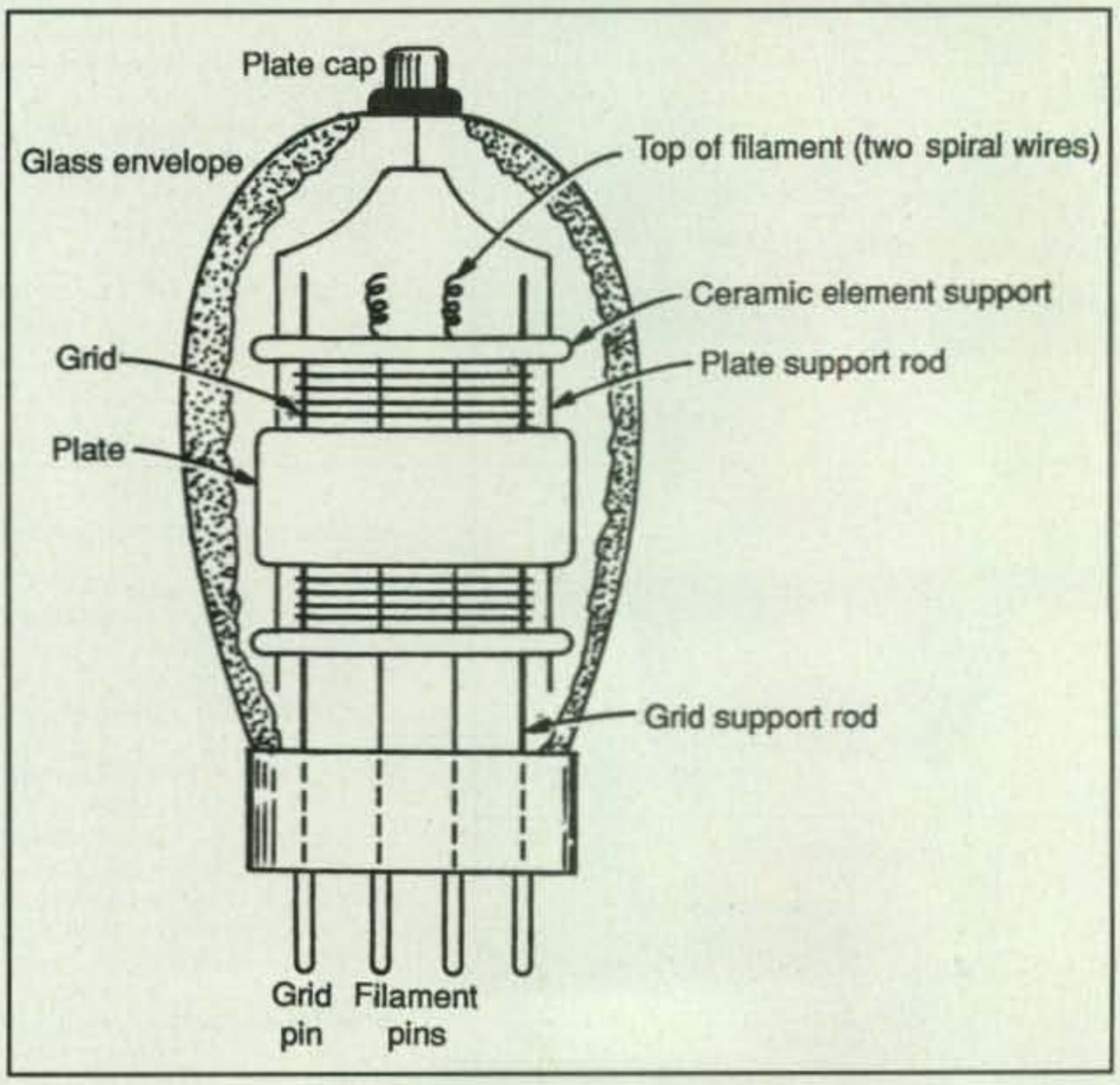

Fig. 1– Outline of elements and support structures within the vacuum tube shown in photo A. →

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100KHz to 1.3GHz*
Triple conversion AM/NFM;
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Super small "credit card" size delivers AMAZING audio quality in a size and weight (as thin as 14.5 mm, as light as 103g) that you can take almost anywhere. Easy to read illuminated LCD, 1,000 memory channels, five operating modes, three different antenna modes, easy to program with free downloadable software (optional cable required), cable-clone, and a long-lasting Lithium ion battery! Standard adapter charges the Li-Ion battery AND operates with AC power, even at the same time, so you can listen while charging.

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Photo B– Our column's main stars proudly stand up for an encore. On the left is the ever-popular glass-envelope 3-500Z (5"L × 3.5"D), and on the right is the world-famous 3CX-1500A7 (3.51"L × 3.38"D). (Photo courtesy Richard Stubbs, KC5NSZ of MFJ Enterprises)

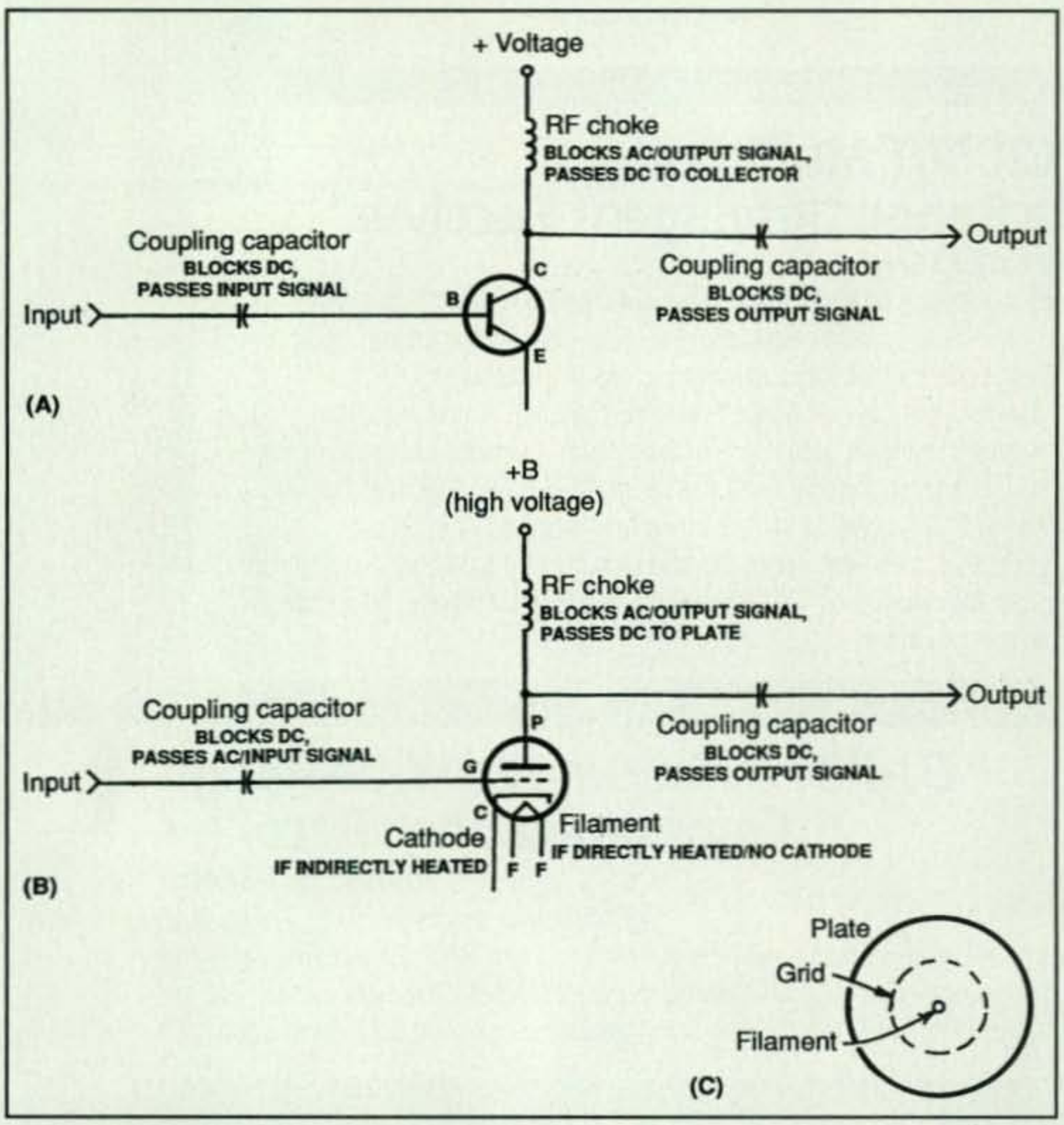

Fig. 2– Comparison of the circuit symbols for an NPN transistor (A), a triode tube (B), and the actual position of elements within a triode tube (C). A transistor's base is equivalent to a tube's grid, its emitter is equivalent to a tube's filament or cathode, and the transistor's collector is equivalent to a tube's plate.

applied to the tube so its plate is positive with respect to its cathode, and thus freed electrons are attracted to the plate. A fine-wire mesh or grid is then added between the filament (if directly heated) or cathode (if indirectly heated) and plate. By applying a negative voltage to that grid, electron movement/current flow within the tube can be controlled (photo A and fig. 1).

Notice there are no physical connections between elements in a tube (cathode, grid, and plate), whereas all three elements (emitter, base, and collector) are physically connected in a transistor. How can current flow if there is no direct (physical) path for conduction? That's where the tube's vacuum enters the picture. The actual "connections" are made through the (tube's) electron's stream. A cross comparison may help understand/clarify that statement (fig. 2).

When an input signal is applied to a transistor, it adds to and subtracts from base bias, thus causing resistance of the base to vary according to the incoming signal. That instantaneously varying resistance causes a similar variation in current flowing from the emitter, across the base, and on to the collector. This results in an amplified copy of the signal appearing between the collector and ground. The same effect occurs in a tube, except instantaneously varying its grid bias (technically called superimposing a signal on the bias) changes how much the grid permits or impedes the movement of electrons from the cathode to the plate, and that also results in an amplified copy of the signal appearing between the plate and ground.

I might also point out a tube's lack of direct inner element connection causes it to exhibit high input and output resistance/impedance, whereas a transistor's direct inner element connections cause it to exhibit low input and output resistance/impedance. Likewise, tubes are considered voltage-operated devices, while transistors are considered current-operated devices. As an example, a tube operating with 800 volts at 300 ma, or .3 amps, has an input of approximately 240 watts and (assuming 50 percent efficiency) an output of approximately 120 watts. Similarly, a transistor operating with 12.5 volts at 20 amps has an input of approximately 250 watts with an approximate output of 125 watts.

Grids, Grids, Grids

While single-grid tubes or triodes are easy to understand and work great in high-power linear amplifiers, two-, three-, and even five-grid tubes are also

used in various applications. There is a natural amount of confusion associated with such multi-grid tubes, however, so let's clear the air with a streamlined why-and-how look at each type.

In an effort to obtain higher amplification while minimizing grid-to-plate capacitance (which can result in unstable circuit operation at radio frequencies), the two-grid, or tetrode, tube was developed. A positive DC voltage slightly lower in amplitude than the plate voltage is applied to this second, or "screen," grid to accelerate electron flow in the tube so the electrons really "hammer" the plate. Operating voltage for this screen grid usually is obtained with a dropping resistor connected to the main high-voltage supply. The (dropping) resistor is also bypassed to ground with a capacitor, so while the screen grid is accelerating electrons and increasing amplification, it is also grounded for AC. Why? Look at a triode tube and notice how its control grid is surrounded by a plate. The two elements act like a coupling capacitor at high frequencies, feeding a small amount of output signal from the plate back to the grid and causing undesired oscillation (the previously mentioned unstable operation). Adding a screen grid bypassed to ground with a capacitor is like placing a ground rod in the middle of that (internal) capacitor; it cancels inner electrode coupling.

The extra amplification secured with a tetrode tube is good, but it also has its consequences—such as increasing tube noise and high screen grid current. These two effects result from high-speed electrons hitting the plate with so much force that they knock off other electrons we call *secondary emissions*. Introduction of a third, or "suppressor," grid minimizes this problem. The third grid (which makes the tube a pentode) is connected to the tube's cathode or ground, and it repels secondary-emission electrons so they stay near the plate rather than flow in the screen grid circuit. Pentodes typically exhibit slightly more gain than tetrodes and seldom require neutralizing (of grid-to-plate capacitance).

Finally, some economy-design radios include a pentagrid (or five-grid) converter/mixer tube in which one grid circuit functions as a local oscillator while the other grid circuit serves as an RF amplifier and the two signals are mixed in the tube's electron stream. The sum, difference, and two original frequencies are then output at the plate and direct-

Watch That Voltage!

Nothing compares to the soft, glowing beauty and stouthearted performance of vacuum-tube gear, but never overlook the potential dangers in its operating voltages. Always ensure high voltage has been removed and/or use your VOM's test leads to check voltage levels before working with vacuum-tube circuitry or projects. Some folks can survive a 500- or 600-volt shock, some folks can't, and no one should ever chance surviving a 3000- or 4000-volt shock from a high-power linear amplifier (as Dirty Harry would say, "Do you feel lucky, kid?").

Also exercise care to avoid contact with 120/240-volt AC wiring connected through on/off switches or relays to power transformers. This voltage may not seem life threatening, but associated AC wiring may be fused at 15 or 20 amps, and contact with resultant 2000+ watts of power could prove fatal.

Dangerous potentials, incidentally, are not confined to vacuum-tube gear: Thirteen volts DC at 20 amps (such as from an unfused power supply or an automobile storage battery) can pass through a ring on your finger, and associated current flow can heat the ring hot enough to sever your finger. I am not trying to scare you, but am simply alerting you to the dangers so you stay safe!

ed to following IF stages where one signal is separated from several other nearby signals. As a sort of "reverse analogy," we might compare pentagrid converter stages to NE612 RF amplifier/local-oscillator/mixer ICs. They both perform the same general task.

Big Tubes + Big Amps = Big Signals

Generally speaking, most radio amateurs consider transistors small-signal devices and vacuum tubes large-signal devices—and the assumption usually proves correct. While writing that fact, however, I recalled a newspaper advertisement intended to highlight a low-cost AM/FM transistor radio producing 500 milliwatts of audio output with low distortion. However, that somehow went astray in the wildest way. When printed, the ad stated that the little radio delivered 100-million watts of undistorted output. The newspaper was quickly corrected and ran a revised ad stating the little palm-size radio produced 100 megawatts of undisputed output.

While smaller size vacuum tubes normally are used for receiving purposes or transmitting at power levels up to 30 or 40 watts, larger vacuum tubes are popular for transmitting at power levels up to 2000 watts—and higher. These power tubes usually fall into one of two categories: glass-envelope types and ceramic-based types. Large glass-envelope tubes such as the ever-popular 3-500Z are used in many kilowatt, or "legal limit," linear amplifiers because they are well proven, reasonably priced, and seemingly will last forever. A single 3-500Z amplifier comfortably delivers 650 watts output and a dual 3-500Z amplifier delivers around 1300 watts output. Higher power is possible with a bit of "pushing." However, the fact is, a good operator can work into the same part in the world with 1000 watts that he/she can work into with 2000 watts.

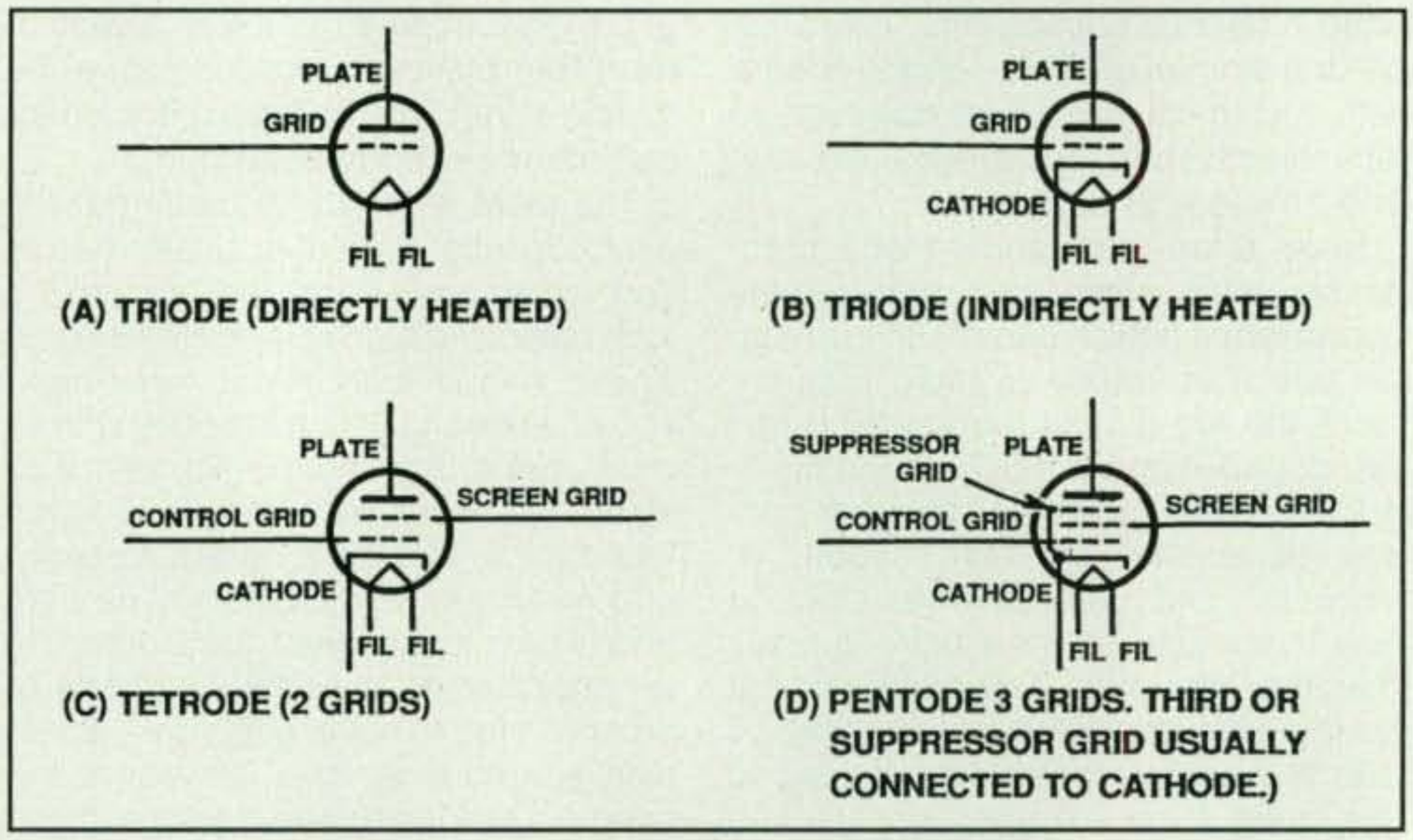

Fig. 3– Comparison of the circuit symbol for different types of tubes as discussed in the text.

Ceramic-based tubes such as the well-known 3CX800 and 3CX1200 are also proving their worth in high-power and "legal limit" amplifiers. They are more expensive to replace than glass-envelope tubes, but if not abused, they exhibit remarkably long life. Some folks also say ceramic tubes do not produce the rich, full-bodied sound synonymous with glass-envelope tubes, and I am inclined to agree. Combine a wide-range Heil microphone with a transceiver featuring a wide SSB transmit bandwidth, add a 3-500Z vacuum-tube amplifier, and the resultant SSB audio sounds absolutely marvelous! That must be the result of high-velocity electrons bombarding the plate, producing even harmonic distortion (which is pleasing to the ear) and a classic "real radio sound" that just can't be equaled. It's grand!

Conclusion

That wraps up our views for this time, friends, and we trust you found it an interesting study of the operation of both triode- and multi-grid tubes (they are oh so warm and cheerful in operation!). During the coming months I plan to highlight more easy-to-assemble, one-tube transmitters in my "World of Ideas" column. I enthusiastically invite you to give one or two a try—while remembering the info presented here and respecting their high voltage, of course!

73, Dave, K4TWJ

A Newcomer's Guide to DXing

BY DAVE INGRAM,* K4TWJ

Surely one of the all-time most popular interests in amateur radio, and an area newcomers (and old pros!) favor, is what we affectionately call DXing. Indeed, the exhilaration of reaching out and contacting other amateurs in distant lands—of hearing your own call letters come back through a group of equally enthusiastic callers—is a thrill of the best kind.

What does it take to become a DXer? It's simple: a reasonably good HF setup (not frightfully expensive, just reliable and pleasant to operate) and a good mindset (DXing is a lifestyle, a conviction, an infatuation!). Equipment-wise, that equates to a modern 100-watt SSB/CW transceiver and the best antenna your budget (and neighbors) will allow. A multi-band beam is the best choice, but you can do quite well with one of the new-style 3/8-wavelength or "no ground system required" multi-band verticals if it is not blocked by nearby buildings or foliage. A good-gain-type wire antenna such as the Extended Double Zepp or the Carolina Windom, available from The Radio Works (www.Radioworks.com), is an acceptable third choice.

A DXer mindset might translate into eating, sleeping, and thinking DX (you do want to become a "big gun," don't you?). Read the DX columns in magazines, the DX bulletins, newsletters, and everything else you can find with reliable information. Keep a list of countries/prefixes on your operating desk. Put a large world map on the wall behind or beside your rig for quickly spotting various countries (it's a big part of that DX mindset). Learn how to visualize times around the world and how to relate those times to life in other lands (a good use for that large map on the wall). As an example, eastern Australia is 8 hours "behind" my particular time zone (CST), while Great Britain is 6 hours "ahead" of my time zone (again CST). Assuming a local time of 7:00 AM, the wee hours of darkness are between my QTH and Australia (where it is 11:00 PM), so 30, 40, 80, or 160 meters may be "open" in that westerly direction. During that same approximate time (7:00 AM), the hours of daylight are between my QTH and Great Britain (where it is 1:00 PM, so 20, 17, and possibly 15 meters may be "open" or may soon "open") in that easterly direction. Just think the following: low bands best at night, upper bands best during daylight, all bands peak around sunrise and sunset. Exceptions to that rule equate to pleasant surprises, too. Now let's discuss some special DX operating tactics.

Smooth Operating Tips

Study the callers in almost any DX pile-up and you will notice some operators are confident and successful, while others struggle just to wrangle a QSO. How do you acquire such "DXpertise"? Everyone has his/her own opinion here and experience is the best teacher, but we have a few useful tips to help you along the way.

Start by ensuring your setup works well and sounds great on both SSB and CW (and I encourage you to give CW a go; it is the most effective way to work DX—really good DX—with a simple setup). Tune in your actual transmitted signal on an extra or borrowed receiver or transceiver (use high-fidelity earphones and do not connect an antenna to the borrowed receiver). Be sure your audio is sparkling clean, without any hum, distortion, or background noise (often the result of frayed microphone wires, a poorly aligned old rig, or RF feedback from a makeshift or indoor antenna). Adjust your rig's transmit audio equalizer to mildly boost treble tones and give your voice maximum clarity.

Next, focus on your operating technique. Listen to some of the folks you hear on the air; notice those who unnecessarily mumble, stumble, and slur their call letters. Visualize the difficulty a DX station would experience trying to understand them and then work on your own speech so it sounds clear and professional. Once perfected, your DXing

Photo 1– An HF setup need not be large and lavish for successful DXing, but it should encourage a good mindset. A world map marked with time zones and prefixes of various countries supports that mindset and makes a good operating asset to boot. With regard to a rig, a midsize, mid-priced transceiver such as this Kenwood TS-2000 is an excellent choice.

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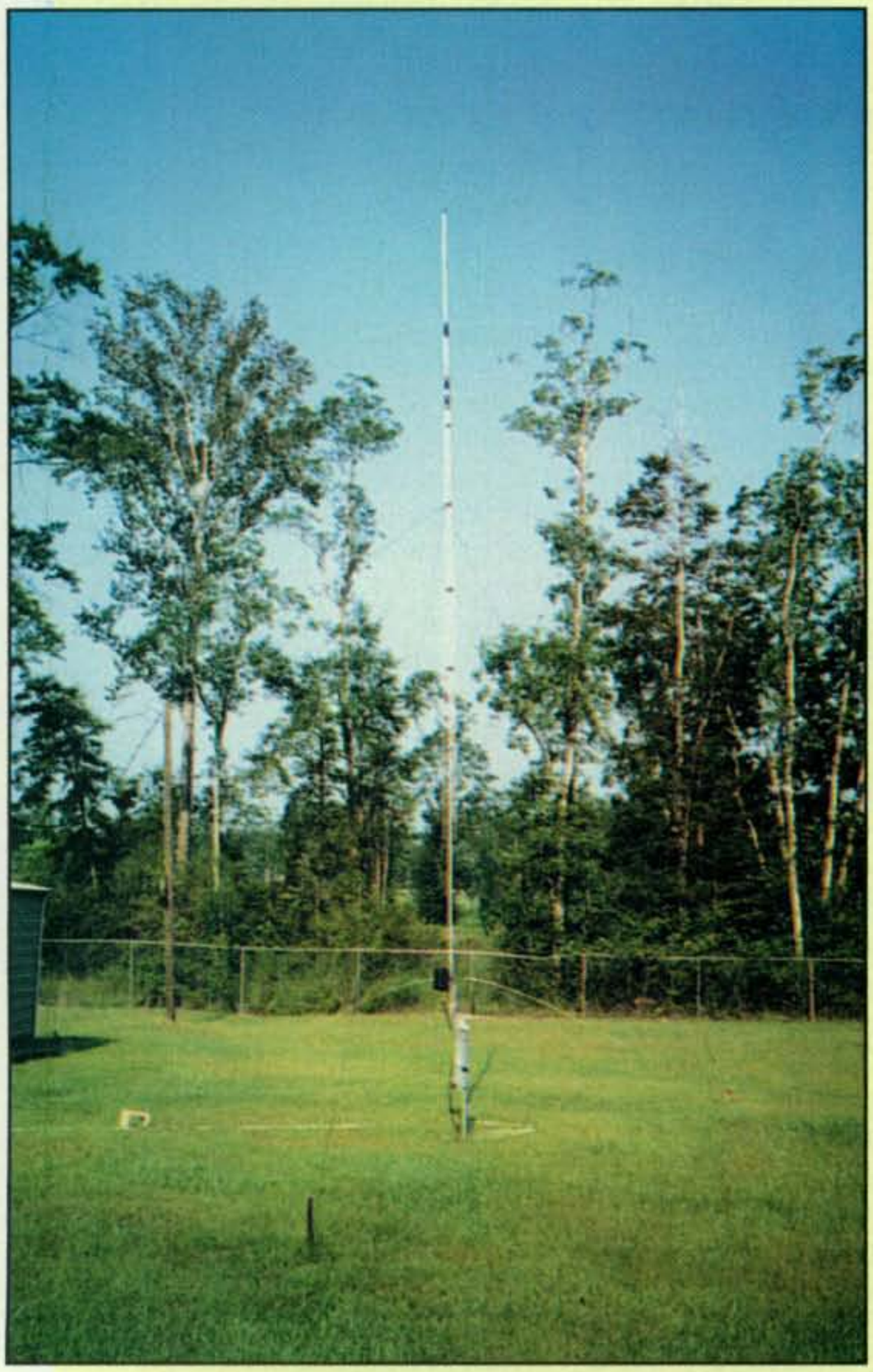

Photo 2– Short on funds, space, or permission to install a large tower and big beam antenna? A "no ground radials required" vertical such as this multi-band Hy-Gain AV640 is a good alternative. It offers mild gain over a regular 1/4-wave vertical, works out almost as well as a beam, and can even be painted to blend with its surroundings. This AV-640 also survived Hurricane Dennis in 2005 just as shown. (Photo by K4TWJ)

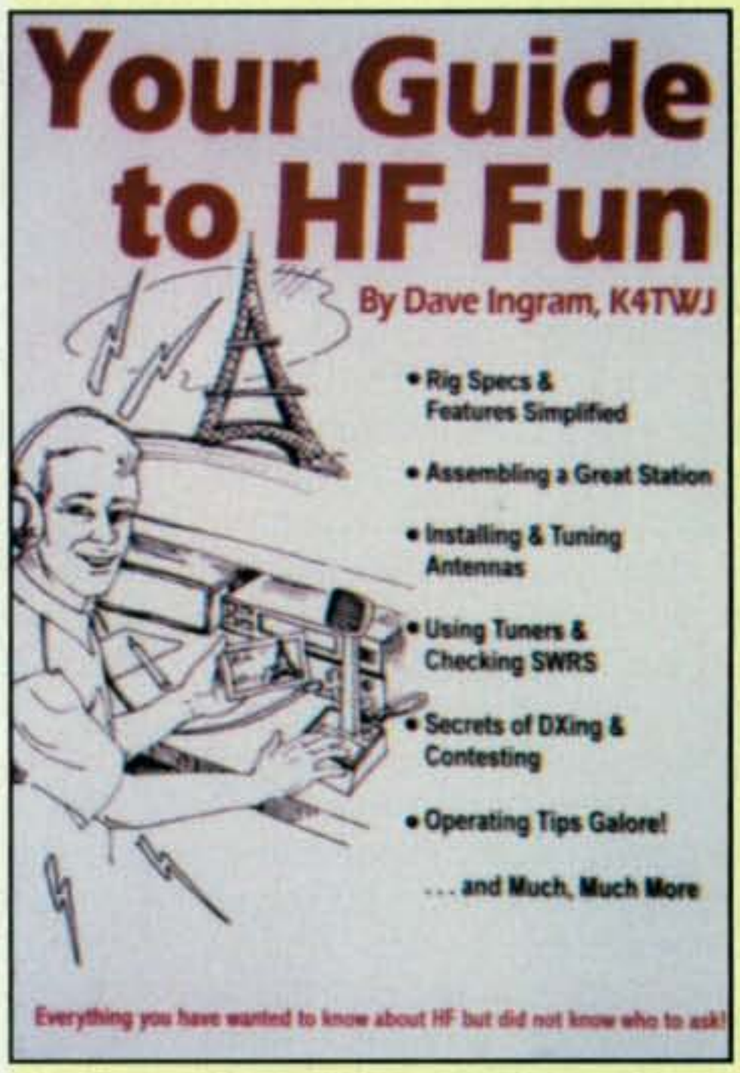

Photo 3– If you would like more tips, tidbits, and helpful Elmer advice for HF success, check out my book "Your Guide to HF Fun" available direct to your QTH from mine. It is loaded with more good information than we could pack into 10 or 20 columns.

results will flourish regardless of your power level. Learning a few "ham words" and maybe the alphabet in a few foreign languages is another beneficial consideration. Sometimes casual/nonpile-up QSOs with bi-lingual DX stations are helpful here. If the DX station continuously repeats, "Yes, QSL! My QTH is XXX and my name is XXX," however, you can assume his/her English is limited, but not as limited as your "DX tongue"!

Dynamite DX'n

Do the pros really have their own secrets for DXing success? That's only a myth . . . or is it? A fair number of DXers habitually monitor WWV's Propagation Forecast on 5.0, 10.0, and 15.0 MHz at 18 minutes after each hour to judge when band conditions are good or poor. The sunspot count, *A*-index, and *K*-index may seem confusing to newcomers until they compare those numbers with band conditions at their QTH over several weeks or months. WWV's propagation reports for the previous and upcoming 24-hour periods, however, are easy to understand and helpful. "Quiet" conditions usually coincide with good band openings, and "Unsettled" conditions usually coincide with not-so-good DX conditions. Solar flares can cause radio blackouts in the G1 or G2 level (poor, but not impossible, band conditions), and R2- or R3-level blackouts usually mean "total dead band" conditions. Watch for the time immediately following such a blackout. That's when the bands really flourish with good worldwide DXing conditions, and when you reap maximum benefit from time spent tuning the bands and monitoring activities.

Think fast and be clever when you spot a DX station. Remember, you may get only one chance to call before the DX wolf pack descends on frequency, so make your first call the best. Listen the split second before making that call to do an instant evaluation of on-frequency activity. Try to sense the DX station's T/R delay and the on-frequency noise he hears when switching from transmit to receive. Then place your call letters dead center of the DX station's listening frequency and receive time. Properly timed (timing is the key!), replying to your call will be a natural reflex!

If you do not "get through" within a few calls, step back and rethink your tactics. Is your speech weak? Is your timing slow or incorrect? Are you just inviting others to "beat you out" while you become "background noise" to the DX? Stop pushing (no need to beat a dead horse). Sit quietly, listen, and note what works and what doesn't work for "getting through." In the meantime, the DX station may notice the absence of your "background noise" call—and that can be better than actually calling (who was that masked man?). Then armed with a new mindset and a new opportunity for success, go for the QSO!

Does your transceiver have dual VFOs (and maybe "split" operating capabilities)? Do you remember my earlier state-

ment about two or three bands being open to DX around an hour after sunrise and an hour before or after sunset? That's the ideal time to set one VFO on one band, set the other VFO on a second band, and then use quick VFO A/B punches to toggle-tune both bands almost simultaneously. Just be sure your multi-band antenna has a low SWR on both bands before transmitting. If one band becomes hotter with activity than the other band, switch both VFOs to the same band for punch-punch double-shot DXing. What to do when you end up with two QSOs simultaneously? Use VOX, switch on your rig's "split" function, then transmit to one while pausing to receive reply information from the other, and then toggle VFOs and QSO. This wild and crazy technique takes practice (a bit of insanity also helps), and it works best on CW with full break-in operation. It is a real kicker though for boosting your QSO count in DX contests.

With regard to the real secrets of DXing, try setting your . . . Well, we are almost out of space for this month, so let's leave those tidbits for next time and wrap up for now.

Conclusion

That concludes our views for this month, friends, and it also now stands as number four in our somewhat eclectic series of helping-Elmer guides for new amateurs. The other three columns (which I encourage you to re-read, along with this column) appeared in the January and September 2004 and April 2005 issues of *CQ*. Another excellent article on DXing appeared in October 2004 *CQ*.. Will there be further additions to this series? Possibly . . . probably . . . depending on your response to the series thus far. Maybe right now is a good time to collect/mark the four issues or put them in a binder for future reference. Finding things when they are needed later is always a challenge.

Incidentally, if you would like more helpful advice, check out my self-published book *Your Guide to HF Fun*. It is loaded with good ideas and suggestions, and it is available direct to your QTH from mine (Dave Ingram, K4TWJ, 4100 S. Oates St. #906, Dothan, AL 36301) for $16.00 plus postage ($2.50 book rate, $3.85 Priority Mail).

Now most important, make a pledge to yourself to get on our HF bands and join the bright lights and fun of worldwide communications. It is terrific, and you should be part of the action.

73, Dave, K4TWJ

Split-Frequency DX'n: A Quick Guide

New HFers often shy away from split-frequency DX pile-ups and with good reason. Coordinating transmit and receive activities on two different frequencies can be confusing. As shown by the following 20-meter QSO with 3B9C on Rodrigues Island in the Indian Ocean, the process is actually easy and often more rewarding than same-frequency DXing.

It is early evening and I am tuning on 20 meters. The band seems quiet with few signals registering above S7. Then what's that? It's 3B9C calling QRZ up 5 kHz! We quickly jot down his exact frequency to avoid losing track of him during the chase, and then press our transceiver's "A=B" button so both VFOs are synchronized on 3B9C's frequency. We then tune one VFO up 5 kHz for transmitting, switch back to the other VFO for receiving 3B9C, and switch on the transceiver's "Split" function. A quick press of the PTT button confirms our transmit frequency is 5 kHz above our receive frequency. 3B9C again announces "QRZ up 5." We listen to the pile-up for a couple of minutes, plan our strategy, and then announce our call letters clearly and confidently. However, he replies to a European station. We tap our transceiver's A/B button to toggle VFOs, then listen carefully and hear the weak European station he is working ever so slightly higher in frequency. We tune in the European for a more natural, or on-frequency, sound, knowing in doing so we will sound more natural to 3B9C and be more centered in his transceiver's passband so our signal can "jump out" at him.

There is another QRZ. We can almost feel the TR relay in 3B9C's transceiver switch back to receive. We sense his operating savvy and the unheard callers in the pile-up. We give another quick and accurate call, and by jove, he is replying—to us! We quickly switch concentration and listen carefully to ensure he has our call correct and also to capture the moment in our memory forever. Then we note the exact QSO time (a couple of minutes' error can make a page difference in trying to locate our QSO in the log for a QSL card. Shazaam! It is over in a flash, 3B9C is on to the next QSO, and we are on an instant adrenalin high. Success while using only a compact 100-watt transceiver and a mild-mannered vertical antenna. Life in the ham lane just doesn't get any better than that, friends!

in the sky

BY JEFF REINHARDT,* AA6JR

The Last Radiogram-
A True Story of Holiday Magic

I don't know what the forces are that converge and sometimes make you do something that has a thoroughly unexpected outcome. Those forces focused on me a few years ago, and they delivered a moment that to this day touches a place deep inside me. Let me share it with you.

I have never been much of a message traffic handler, with just two exceptions. One was in the aftermath of the Northridge, California earthquake that interrupted phone service for several days back in January 1994. I had a packet station on the air and was part of a packet club that operated a fairly extensive network. This was prior to the proliferation of e-mail and the internet, and at that time packet was the "hot" thing in ham radio. Our packet system could relay a message just about anywhere on the planet in a matter of hours. In the aftermath of the quake our packet bulletin board, operated by Rick Leyton WB6WFH, was flooded with health & welfare inquiries. When all was said and done after the quake, Rick's BBS handled thousands of health & welfare inquiries. Club members and others responded by doing the follow-up and relaying messages back. This was usually done through a local phone call or a visit to the address of the person for whom the inquiry was intended.

That showed me the power of amateur radio in getting through under adverse conditions. I had been aware of traffic nets, CW and phone, but a busy schedule never permitted me the luxury of being a regular in those endeavors. However, the packet method of forwarding messages had appeal because it was passive. Rick set up his BBS to automatically forward to me personal messages along with traffic messages for my area. Like many others, my home TNC had its own mailbox and I left it on 24/7. To those hams not familiar with packet, the terminal node controller, or TNC, is a "wireless modem" that connects to a radio and your computer, and when a message addressed to you arrives, many TNCs flash a LED message "blinkie" to show "you have mail."

Following the burst of activity after the Northridge quake, I seldom received "traffic" messages, but always left on my TNC and a dedicated radio tuned to our local packet network frequency. Every now and then I got a "happy birthday" message sent to someone, and just for fun I printed the message on a standard ARRL traffic message-handling form, which looked a lot like an old-fashioned telegram message (see photo). For the price of an envelope and a first-class postage stamp, I sent the Radiogram message to the recipient. I figured what the heck; they'd get a hoot from it. A few folks called to say "thanks," and I chalked it up to a postage stamp well expended. As e-mail began to catch on, though, packet traffic fell off to practically nothing.

THE AMERICAN RADIO RELAY LEAGUE

RADIOGRAM

VIA AMATEUR RADIO

NUMBER | PRECEDENCE | HX | STATION OF ORIGIN | CHECK | PLACE OF ORIGIN | TIME FILED | DATE

TO

THIS RADIO MESSAGE WAS RECEIVED AT
AMATEUR STATION _____ PHONE _____
NAME _____
STREET ADDRESS _____
CITY AND STATE _____

TELEPHONE NUMBER

REC'D FROM DATE TIME

SENT TO DATE TIME

THIS MESSAGE WAS HANDLED FREE OF CHARGE BY A LICENSED AMATEUR RADIO OPERATOR, WHOSE ADDRESS IS SHOWN IN THE BOX AT RIGHT ABOVE. AS SUCH MESSAGES ARE HANDLED SOLELY FOR THE PLEASURE OF OPERATING, NO COMPENSATION CAN BE ACCEPTED BY A "HAM" OPERATOR. A RETURN MESSAGE MAY BE FILED WITH THE "HAM" DELIVERING THIS MESSAGE TO YOU. FURTHER INFORMATION ON AMATEUR RADIO MAY BE OBTAINED FROM A.R.R.L. HEADQUARTERS, 225 MAIN STREET, NEWINGTON, CONN. 06111

THE AMERICAN RADIO RELAY LEAGUE, INC., IS THE NATIONAL MEMBERSHIP SOCIETY OF LICENSED RADIO AMATEURS AND THE PUBLISHER OF QST MAGAZINE. ONE OF ITS FUNCTIONS IS PROMOTION OF PUBLIC SERVICE COMMUNICATIONS AMONG AMATEUR OPERATORS. TO THAT END, THE LEAGUE HAS ORGANIZED THE NATIONAL TRAFFIC SYSTEM FOR DAILY NATION-WIDE MESSAGE HANDLING

PRINTED IN U.S.A.

Fast Forward

A few years later, as the holiday season came to a close, I came down to my shack on a Saturday morning to be greeted by a flashing yellow LED indicating there was a message waiting in my TNC. I booted the computer, activated the terminal program, and connected to the TNC's mailbox.

It was a traffic message directed to a mailing address in my city. I opened the note. It was from a young Marine recruit who was in basic training. The message was addressed to his mom. In essence the message said, "I'm OK and just wanted to say hello. Can't use the phone, so I hope you

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e-mail: <aa6jr@cq-amateur-radio.com>

get this OK. I love you and miss you all. Will see you soon," followed by his name.

It would have been easy to pick up the phone and call the addressee. However, a feeling swept over me that said, "Deliver the message in person." I pulled out the Radiogram pad and as neatly as I could carefully printed the message onto the ARRL form. I then placed it in an envelope, jumped in the car, and drove across town to the address, which was just a few minutes away.

It was a Saturday morning in January that a lot of folks were devoting to taking down their holiday decorations—time to put away the ornaments and lights for another year. When I arrived at the address, I double checked my information and pulled up in front of a modest suburban home.

Making my way to the door, I noticed the place was still fully decorated with holiday lights and more. I rang the doorbell and waited. No response. I rang it again. Just as I was ready to turn and leave, I heard a stirring and a tug at the front door. A man about my age answered. I explained that I had a message from the young Marine and asked if this was the correct address. He said it was, and I went to hand him the envelope. He said, "No, wait." He then called his wife. When she came to the door, I explained to her that I was a ham radio operator and that I had received a message for her from her son that morning.

Her eyes grew large and she asked, "Is he OK?" I assured her he was and handed her the envelope. I turned to walk away and she said, "No, wait." She carefully opened the unsealed envelope and took out the Radiogram. A huge smile was accompanied by tears that ran down both cheeks. As she wiped away the tears, she looked at me with a bittersweet smile and said, "Thank you. He joined the Marines back in December. They told him that the phone was 'off limits' during boot camp, that he could only write letters home." She added, "This – this is a wonderful surprise – you don't know how much this lifts my day." She told me that the family was keeping its holiday decorations up until he returned home so they could celebrate their Christmas together. It would only be another few weeks.

Her husband asked how I had received the message. I explained it is a service ham operators do. He offered to pay for my gasoline or any other expenses. I told him we do this because it's a tradition of our hobby, not for any remuneration, and that in fact, it would be against the rules that govern our service for me to accept anything.

Mom was re-reading the message again and again. She held it close and said it was kind of me to deliver it. They invited me in for coffee, but I politely declined. I wished them both well and headed back to my car.

Sliding behind the steering wheel, I paused to collect my thoughts. I had never felt so proud to be a ham radio operator as at that moment. Had I placed the call or mailed the message in an envelope, I'm sure the message would have been well received, but it would not have resulted in one of those heartwarming moments forever burned into my memory. And the mom had a small memento that not only reminded her of her son, but also of the many hams who helped bring that welcomed message to her home. I was just the last link in that chain.

On that January Saturday, the post-holiday chill was driven away by the Magic In The Sky.

73, Jeff, AA6JR

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

It's Your Turn! Time to Tell Your Story in *CQ*

One of the most interesting and yet most frustrating functions in my office "day job" is convincing our engineering and technical staff to write articles about their creations. These extremely talented people are doing all kinds of wonderful things, and the world must know about them. This is important in many ways, including the dissemination of knowledge, and the exposure and recognition articles give to The Company and its individuals.

For amateur radio *CQ* has a very similar purpose: to educate, to entertain, and to recognize developments and "happenings" in ham radio. Now it is your turn to tell your story to the readers of this magazine. Everyone who enjoys participating in the ham radio service had to go from knowing nothing (or nearly nothing) about ham radio, to studying and passing the exams and buying (or borrowing) their first set of equipment. Since others are always following in our footsteps, there will always be someone looking for some information that you (all of us) possess. How about sharing this knowledge with others in the form of an article? Even if you're new to the hobby, there may be something unique in your getting-started story that others will appreciate, or maybe you were introduced to ham radio in an unusual and interesting way.

This column is not intended to be a step-by-step article on how to write; it is meant to encourage everyone to try his or her hand at writing a ham radio article and submitting it for publication. See the References section for more information and details about writing for the ham magazines.

A big secret in the writing game is that most articles you see in the magazines are written by everyday, ordinary hams. If writing about your ham radio projects and adventures is not "your bag," but you have a useful project or idea, or an interesting story to tell and want to share it, find someone to help you do the write-up–your club's newsletter editor is a good person to ask for help.

If you have a talent for writing, you should consider writing about your friends' or club members' projects and experiences. As you help your friends write the articles, remember to give credit where credit is due. Tell us where the ideas came from. It is perfectly okay to "borrow" from another idea for a story, but you must provide a credit to the original source. After all, that would be the professional (and the right) thing to do. Also, don't even think about plagiarizing stuff to write your article. Use your own imagination and good common sense.

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A good photo will show action, or raise curiosity. A single image can illustrate several different articles. Refer to the text for more details.

What to Write About?

There are all kinds of things you can write about, including technical and non-technical hints and tips and techniques, like how to successfully get through a tough pile-up on 20 meters with a 5-watt rig and a dipole antenna, or how to modify your ancient "boat anchor" of a rig for better receiver performance, or how you managed to achieve over 200 contacts in the last CQ World-Wide DX Contest with a simple wire antenna thrown out the window, or how you were able to diagnose that irritating ignition noise that no one else could figure out. In other words, if your story contains useful information and if the story is told in an interesting way, chances are good that it will be published.

However, because all the magazines get many articles on these topics, you must use some creativity in making "something completely different" and interesting. This is known as a story's "angle." In other words, rather than just telling the story of how to construct a wire antenna, you should tell

the readers what makes your wire antenna different from the millions of wire antennas already being built and used. Maybe you used a unique building material, or the installation was in an unusual place.

Your best bet is to start with a "query" letter or e-mail to the editor, briefly describing the article you'd like to submit and asking if he/she is interested. This is a "sales pitch" letter, so use it to let the editor know how your article would stand out from all the others on similar topics. The editor will either give you a conditional go-ahead, say "sorry, we can't use it," or suggest an approach that might help your article fill a need in the magazine.

A New Concept: "Re-Purposing"

One of my productivity secrets is: "Repurpose" to minimize work. This is a technique that I have developed to simplify my life and yet maximize output, since I always seem to have way too much to do in the first place. I am sure that I am not the only one who does this. Here are some examples of what I mean:

I usually take notes (either mental or written) on certain things I do, so that I can learn from the experience and find ways to improve the results or outcome. For example, during a recent radio contest, I changed a few things in my radio setup to improve its capabilities, including adding a power amplifier and enabling the CW mode. During the contest I made several observations on what happened, and during breaks in the action I took the time to scribble those thoughts down on a piece of paper.

When building a project or modifying or repairing a piece of equipment, I always have some sort of document to work from in order to complete the job. Certainly, some scribbling must be done before work begins, such as a schematic or block diagram at the very minimum. When the project is done, the notes can be sorted and edited to create the body text for an article. During the process I pause to snap a few photos to add to the documentation. The images can be used to illustrate ideas and further explain what is going on in the text. These notes and pictures become the beginnings of an article. This is re-purposing in action!

A Single Picture is Worth More than a Thousand Words

Speaking of photos, refer to the one in this article. It is a good idea to make an "image library" filled with photos and a brief description of what is going on. Do not forget to mention who appears in the photo, if they can be identified, and just to be on the safe side of things, make sure you have their permission to use the photo. These pictures can also be re-purposed to help illustrate a multitude of articles. For example, the first and original purpose of the image in this article is to document what happened during a recent VHF contest. Several captions could be used:

Caption 1: Special event callsign WW2CQ/66 was activated during the 2005 January VHF Sweepstakes Contest. Left to right: Rich Whited, KG6JKJ; Dennis Kidder, WA6NIA; and Jim Leonard, WA6TFZ.

Caption 2: Rich Whited, KG6JKJ; Dennis Kidder, WA6NIA; and Jim Leonard, WA6TFZ, raise the long-boom 2-meter Yagi antenna at Jim's QTH in preparation for the 2005 ARRL January VHF Sweepstakes Contest.

In addition, the photo can also be used to illustrate an article describing antennas for portable or temporary operations, like this:

Caption 3: A 10-foot push-up mast with guy wires can be used to support a beam antenna for portable operations. Left to right: Rich Whited, KG6JKJ; Dennis Kidder, WA6NIA; and Jim Leonard, WA6TFZ.

If you're using a photo taken by someone else, be sure to provide credit at the end of the caption ("Photo by..." or "Photo courtesy of ...")

Sometimes You Win, Sometimes You Lose

After you submit an article for publication, you must wait patiently for the decision to come in. This may take a few weeks as the editors sort through their incoming material. Usually a group of editors and staff get together to decide which articles will be accepted and which ones will not. Sometimes an editor will suggest changes that will lead to acceptance of an article that would otherwise be rejected.

If your article gets rejected, it is not the end of the world. You can either rewrite it or submit it to another publication. Do not submit your article to multiple publications at the same time, and you should wait until you get a rejection letter before submitting the article to another publication. *(If you DO submit your article to more than one publication at a time anyway, even though it's unprofessional, be sure to let all the editors know that you've done so, and as soon as you get an acceptance from one publication, withdraw it from consideration by all others.—ed.)*

Meanwhile, you may want to begin another article, or create a new and "similar yet different" article on the same topic or angle.

I hope this column helps to transform you into a writer as well as a reader of this magazine, especially since we all have stories to tell!

73, Wayne, KH6WZ

References

CQ Writer's guide: <http://www.cq-amateur-radio.com/guide.html>
Digital image advice: <http://www.arrl.org/pio/handbook/digital-image-advice.html>
QST Writer's guide: <http://www.arrl.org/qst/aguide>
The PIO Handbook: <http://www.arrl.org/pio/handbook/contact.html>
"The Writing Game," June 1996 *QST*, pp. 60–61

dx

BY CARL SMITH,* N4AA

Peter I Update

Happy New Year, and may the new year bring you all that you hope for. After a couple of years of health problems, I personally am looking forward to having a better year.

DX News

Mike, KH6ND, and Kimo, KH7U, spent a few weeks on Palmyra Atoll in November. They were doing some annual maintenance work, installing communications facilities, etc. In their "off" time they spent a lot of time on the air (SSB/CW/RTTY) working all the bands that propagation would allow. Mike has developed a talent for RTTY contesting and spent one weekend passing out KH5 to the WAE contesters on several bands. Even I managed to work him on a couple of bands. QSL KH6ND/KH5 via K2PF and KH7U/KH5 via AH6NF.

What's happening in the DX world for 2006? Well, by now you know the Glorioso DXpedition was delayed until the March/April time period. However, we do have the much-anticipated Peter I DXpedition coming up in late January. At this writing everything appears to be in order for the team to make the trip. Peter I is ranked very high on the Most Wanted lists and this group is determined to bring it way down the list this time around. I found an interesting comment on the Peter I website. It says: *More people have flown in outer space . . . than have set foot on Peter I Island!* Quite a distinctive addition to the team members' resumeS, don't you think?

More on Peter I

Just as I was putting this column together I received the following update, and I'll quote it in its entirety:

Since our last announcement much has been accomplished toward our goal of activating Peter I early next year.

In September, 14 of the team met for four days in Atlanta to practice erecting the arctic shelters and the low-band antennas, check out the generators and other critical equipment, and begin packing the crates for shipment. In addition, a total of 10 hours was spent in classrooms discussing safety, offloading procedures and priorities, fundraising, recruiting, our current budget, and the status of our vessel and helicopter arrangements. There was also time for team bonding, as we assimilated three new team members: FM5CD, N6JRL, and W8MV.

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All those QSL requests are for K7C. Tom, K4TSJ/N4XP, says he's just waiting for the logs and cards and he will start answering them. Note that small stack in the back; Tom says those arrived with no SASE, envelope, postage, or anything. Therefore, they will be the last to be answered . . . via the bureau. (Photo courtesy of Tom, N4XP)

Roger, G3SXW/C21SX, and Nigel, G3TXF/C21XF, at their respective operating positions on Nauru last October. They made over 12,000 Qs in the nine days they were on the air. Roger said they could have done much more, but three of their bags were "lost" for three days. Those bags contained their antennas and one amplifier. (Photo courtesy of Nigel, G3TXF)

Tom, HBØ/DL2OBO, was active from Liechtenstein for a week last October. (Photo courtesy of Tom, DL2OBO)

The WPX Program

SSB

2946 ..... CE2SQE 2947 ..... K5WAF

CW

3162 ..... K5WAF

Mixed

1961 ..... K5WAF

CW: 350 W3UTD. 950 K5WAF. 1750 JA6GWU.
SSB: 450 W3UTD. 1050 AE9DX.
Mixed: 1100 K5WAF.

10 Meters: K5WAF
15 Meters: K5WAF
20 Meters: K5WAF
40 Meters: SV1EOS, K5WAF
80 Meters: K5WAF
160 Meters: K5WAF

Asia: K5WAF
North America: K5WAF
South America: K5WAF
Europe: K5WAF
Oceania: K5WAF

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

During the month of October, we received the great news that Gary Stouder, K9SG, our team physician from the 2005 team, would be able to join us again. Also, Al Hernandez, K3VN, a veteran of many Antarctic DXpeditions and an old friend, has joined the team. We are pleased to have them both and they bring our number to 20 men. We have room for two more operators and as many as four "other" travelers who may want to go along, set foot on the island, help with the camp setup, enjoy the travel experience, but not actually be part of the operating team. They would remain on the vessel. Contact Bob, K4UEE, at <mallphin @aol.com> if you have an interest in either opportunity.

Our 40-foot shipping container has been packed and is now on its way to Chile. After returning from South America earlier this year, we completely unpacked everything, sorted and prioritized all of our equipment, and then repacked. It was a huge job, but it will be worth the effort when we arrive at

QSL Information

GB2ØØT via G4DFI
GB2LBN via GM4UYZ
GB2LD via G8APZ
GB2MOF via GM4UYZ
GB5SIP via GWØANA
GDØEMG/P via MØBEW
GM2T via GM4UYZ
GU1OCN via G5XW
GU5XW via G5XW
H4ØHL via HL1XP
H44HL via HL1XP
HBØ/ON6UQ via ON6UQ
HB2H via HB9CXZ
HB5CL via HB5CL
HB5H via HB9CXZ
HB5RL via HB5RL
HB7H via HB9CXZ
HB9CL via HB9CL
HB9H via HB9CXZ
HE7H via HB9CXZ
HSØZFS via LX1KQ
HSØZFS/8 via LX1KQ
IBØ/IZØCKJ via IZØCKJ
IBØ/IZ7ATN via IZØCKJ
ID9/IZØEHO via IZØEHO
IIØSRT via IZØBTV
II1SRT via IZ1GJK
II2SRT via I2JJR
II3SRT via I3BQC
II5SRT via IZ5BTC
II6SRT via IZ6FZS
II7SRT via IZ7FLT
II8SRT via IZ8EDJ
II9ETN via IT9VCE
II9SRT via IT9MUF
IMØ/IK5ZTT via IK5ZTT
IP1/IK4GLV via IK4GLV
IP1/IK4JPR via IK4JPR
IP1/IK4RUX via IK4RUX
ISØ/F5CWU via F5CWU
J3/NØKE via NØKE
J3/NØVD via NØVD
J3/SP9BQJ via SP9BQJ
J3/SP9PT via SP9PT
J3/W8QZA via W8QZA
J37K via AC8G
J3A via WA1S
J43XG via HA4XG
J48HW via HAØHW
J59OFM via IZ3BIY
LA3SRK/P via SM5SIC

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

On the Cover

Yes, Mark Jensen, KAØWTX, is checking the SWR of his flagpole . . . because his flagpole is really a Stealth Bazooka antenna (www.iacantennas.com/stealthbazooka.htm), which allows him to get on the air on 80–10 meters from his covenant-restricted neighborhood in West Fargo, North Dakota. Under the snow, and under the sod, are 16 radials, which Mark laid out before the sod was put down. His coax also runs underground–not a bad idea for North Dakota winters. Inside his shack Mark uses a Kenwood TS-940 to operate SSB and digital—mostly PSK 31. He says his favorite on-air activities are ragchewing and the opportunity to learn new things from his fellow hams.

Mark first became interested in ham radio as a boy, when his uncle, WØSIF, loaned him a National receiver and later a Hammarlund HQ-140, and he got deeply involved in ham radio while in school. However, he never had a chance to get a license. It wasn't until he was settled in Fargo, with a job and a family, that he was able to "spring free some time" to take a licensing class offered by the Red River Radio Amateurs, in 1986. (His two sons later attended RRRA classes and got their licenses, although neither one is active at the moment.)

A surgeon at the Fargo VA Medical Center, Mark is hoping to work ham radio into an annual medical mission to Haiti that he makes each January. After his first trip last year, Mark says, he filed paperwork with Haitian authorities for a license, but he has not yet gotten a response. Mostly, though, he looks to ham radio for a break from the pressures of his job. "The thing I really like about ham radio," he says, "is that it's so different. I can really learn something completely new." *(Cover photo by Larry Mulvehill, WB2ZPI)*

The WAZ Program

15 Meter SSB

624 ..... RA3DNC
625 ..... YB1A

40 Meter SSB

104 ..... EA8AYV

80 Meter SSB

85 ..... EA8AYV

12 Meter CW

50 ..... OH2BCK

20 Meter CW

555 ..... OH2BCK
556 ..... RA6LW
557 ..... RZ3DJ

30 Meter CW

70 ..... WA5VGI
71 ..... JA2EPW

40 Meter CW

247 ..... OH2BCK

All Band WAZ

SSB

4974 ..... TA3J
4975 ..... IK2OVC
4976 ..... IT9RTA
4977 ..... JA1FJJ
4978 ..... IK2SVF

Mixed

8381 ..... TA3J
8382 ..... KI4DLS
8383 ..... HL2CFY
8384 ..... UA4CC
8385 ..... K8DE
8386 ..... WV1K

All CW

471 ..... RZ6AE
472 ..... KØSQ

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

CQ DX Awards Program

SSB

2473 ..... EA8AYV
2474 ..... TA3J
2475 ..... TA3YJ

SSB Endorsements

320 ..... PY2YP/335
320 ..... N7WR/331
300 ..... EA8AYV/302
275 ..... K6GFJ/299
150 ..... TA3J/195
1.8 MHz TA3J
3.5/7 MHz EA8AYV
3.5/7 MHz TA3J
28 MHz EA8AYV

CW Endorsements

320 ..... PY2YP/334
320 ..... W7IIT/327
300 ..... W9IL/309

RTTY Endorsements

320 ..... OK1MP/321

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

5 Band WAZ

As of November 1, 2005, 683 stations have attained the 200 zone level and 1473 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

UA4CC

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
WAØQII, 199 (26)
N4PQX, 199 (26)
JA5IU, 199 (2)
N6HR/7, 199 (37)
CT3DL, 199 (26)
NØIJ, 199 (21)
RU3DX, 199 (6)
N4XR, 199 (22)
WØPGI, 199 (26)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
RX9TX, 198 (2, 6)
F5NBU, 198 (19, 31)
WA5VGI, 198 (34, 37)

The following have qualified for the basic 5 Band WAZ Award:

CT1EKY (176 zones)
VE3CFK (156 zones)
JI4POR (196 zones)
JH4CBM (196 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

Peter I. The container contains exactly 11 tons of equipment, and personal gear.

Our contract calls for 16 days on Peter I. The weather will dictate our actual schedule, but we are projecting that we will be 12–14 days on the air. We have developed a quick strike plan that will enable two stations on the air quickly even if we have weather conditions that prevent the entire camp from being constructed immediately. Ultimately, we plan to have nine stations on the air and a complement of 23 antennas. This doesn't include the recent decision to make a real effort on 6 meters, 2 meters, and 70 cm EME.

For the first time, we can give approximate dates of our operation. The team will assemble in Punta Arenas on Jan. 29th and shortly afterward fly to the Chilean Naval Base on King George Island, South Shet-

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 335 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 334	W2FXA 334	I4LCK 334	K8LJG 332	K9IW 331	K7JS 329	YV5ANT 324	G3KMQ 317	G3DPX 284
K2FL 334	N4JF 334	PY2YP 334	YU1AB 332	K7LAY 331	K5UO 329	N5ZM 323	YT1AT 317	EA3BHK 282
K9BWQ 334	K4MQG 334	WB5MTV 333	K5RT 332	K4JLD 331	W6OUL 329	KE3A 323	K8JJC 315	YC2OK 282
K9MM 334	EA2IA 334	W7CNL 333	YU1AB 332	W2UE 330	K9OW 328	N7WO 323	W6YQ 314	DJ1YH 281
W7OM 334	PA5PQ 334	YU1HA 333	NØFW 332	VE7CNE 330	W4QB 327	KE5PO 322	UA9SG 310	XE1MD 280
K2JLA 334	K3UA 334	IT9QDS 333	N4AH 332	4N7ZZ 330	SM5HV/HK7 327	IKØTUG 321	EA3ALV 306	WD9DZV 277
N7FU 334	DL3DXX 334	K4CEB 333	HB9DDZ 332	W6DN 330	W7IIT 327	VE7DX 320	YU7FW 306	W2JLK 277
K2OWE 334	K2ENT 334	K4IQJ 333	WB4UBD 332	YU1TR 330	KA3S 327	IKØADY 320	LU3DSI 302	I3ZSX 276
N4MM 334	OK1MP 334	WØHZ 333	K6LEB 331	W4UW 330	IT9TQH 326	WG5G/QRPp 320	N1KC 302	
F3TH 334	NC9T 334	N5FG 333	VE3XN 331	N6AW 330	I2EOW 326	W3II 320	RA1AOB 300	
F3AT 334	W2VJN 334	K4CN 333	W1WAI 331	G3KMQ 329	K6CU 326	F5OIU 320	VE7KDU 300	
DJ2PJ 334	G4BWP 334	W4MPY 333	K2JF 331	KZ4V 329	W4LI 325	F6HMJ 319	KT2C 300	
WA4IUM 334	N7RO 334	W8XD 333	K3JGJ 331	N5HB 329	N4OT 325	OZ5UR 319	K4IE 291	
W4OEL 334	W1JR 334	KA7T 332	WA8DXA 331	K1HDO 329	K1FK 324	PY4WS 319	WA4DOU 289	

SSB

K6YRA 335	K5TVC 335	PY2YP 335	W3AZD 334	K9IW 332	CT1CFH 329	IKØIOL 325	XE2NLD 315	KW1DX 295
K2TQC 335	N5FG 335	WDØBNC 334	YZ7AA 334	DL9OH 331	EA1JG 329	YT1AT 325	WZ3E 314	W4EJG 295
W6EUF 335	DJ9ZB 335	K2FL 334	CT3BM 334	YV1JV 331	W9IL 329	K7HG 324	IZ6CST 314	K7ZM 292
K2JLA 335	PY4OY 335	WØYDB 334	N6AW 334	WA4WTG 331	KE4VU 328	ZL1HY 324	W7GAX 312	K1RB 292
K4MQG 335	VE3XN 335	W4UW 334	WS9V 334	W8KS 331	KF8UN 328	K4JDJ 323	YV5NWG 311	KØOZ 291
IK1GPG 335	4Z4DX 335	K9BWQ 334	4N7ZZ 333	YV5IVB 331	WØULU 328	W6WI 323	WA5MLT 310	W9ACE 291
K5OVC 335	N7RO 335	W4NKI 334	KE5PO 333	KX5V 331	K1EY 328	EA3CYM 323	XE2NLD 310	I3ZSX 290
NØFW 335	IØZV 335	WB4UBD 334	VE1YX 333	K3JGJ 331	KZ4V 328	KE4SCY 323	VE7SMP 310	N2LM 286
K9MM 335	EA2IA 335	W4UNP 334	W2JZK 333	N5ORT 331	XE1D 328	K6CF 322	RW9SG 310	KKØDX 285
W6BCQ 335	IN3DEI 335	W8AXI 334	K8LJG 333	PT2TF 331	K3LC 328	LU7HJM 322	WØROB 307	VE7HAM 285
XE1AE 335	EA4DO 335	VE2GHZ 334	VE4ACY 333	CT1AHU 331	K4DXA 328	WA4ZZ 322	KK4TR 306	N8LIQ 284
W7OM 335	PA5PQ 335	OE2EGL 334	KØKG 333	EA3JL 331	LU5DV 328	WN9NBT 322	XE1MDX 305	WØIKD 283
KZ2P 335	K9OW 335	WA4IUM 334	VE2WY 333	K1HDO 331	I1EEW 327	WW1N 322	WB2AQC 305	K7SAM 283
IK8CNT 335	W6DPD 335	K5RT 334	WB3DNA 333	K5UO 331	SV1ADG 327	W6OUL 322	K3BYV 303	KBØRNC 282
VK4LC 335	XE1VIC 335	W2FXA 334	K9PP 333	W6DN 330	F9RM 327	KD5ZD 322	YC2OK 303	IK8TMI 281
OE7SEL 335	K2ENT 335	W6SHY 334	W2CC 333	YV1CLM 330	XE1MD 327	XE1CI 321	JR4NUN 303	F5JSK 281
VE3MR 335	OK1MP 335	W5RUK 334	DL3DXX 333	AB4IQ 330	IØSGF 327	CT1ESO 321	VE7KDU 302	KA5OER 280
VE3MRS 335	IK6GPZ 335	K4CN 334	EA3BMT 333	AE5DX 330	IT9TGO 327	KØFP 320	W5GZI 302	F5INJ 279
K4MZU 335	K1UO 335	EA3KB 334	EA3EQT 333	KB2MY 330	IT9TQH 327	EA7TV 320	W4PGC 302	WD9DZV 278
OZ5EV 335	I8KCI 335	K3UA 334	YV1KZ 333	K3PT 330	DK5WQ 327	SV1RK 320	EA8AYV 302	W5GT 276
N7BK 335	I8LEL 335	K4JLD 334	KE3A 333	ZL1BOQ 330	KE5K 327	N1KC 320	YV2FEQ 301	4Z5FL/M 275
K7LAY 335	DU9RG 335	N5ZM 334	YV1AJ 332	N7WR 330	CP2DL 327	W5GZI 320	AC6WO 301	K9DXR 275
ZL3NS 335	DU1KT 335	PY2YP 334	KSØZ 332	WS9V 329	NI5D 327	SV3AQR 320	4X6DK 301	
N4MM 335	N4JF 335	AA4S 334	LU4DXU 332	K2JF 329	K7TCL 326	KD2GC 320	SV2CWY 300	
OZ3SK 335	CT1EEB 335	CT3DL 334	VE4ROY 332	ZL1AGO 329	W9HRQ 326	W5OXA 317	4X6DK 300	
K7JS 335	W4WX 335	NC9T 334	W7FP 332	W9OKL 329	HB9DDZ 326	YV4VN 317	N5WYR 300	
XE1L 335	W1JR 335	W9SS 334	K9HQM 332	I2EOW 329	WR5Y 325	LU3HBO 317	K4IE 300	
YU1AB 335	N4CH 335	VE7WJ 334	W2FKF 332	VE7DX 329	KC4MJ 325	K6RO 316	K6GFJ 299	
OE3WWB 335	I4LCK 335	VE2PJ 334	CT1EEN 332	W2FGY 329	PY2DBU 325	N8SHZ 316	WA1ECF 295	

RTTY

K2ENT 333	K3UA 328	N5FG 325	EA5FKI 320	W2JGR 316	KE5PO 297	W4EEU 297	I2EOW 291	YC2OK 280
WB4UBD 332	NI4H 325	G4BWP 325	OK1MP 321	PA5PQ 311				

land Islands. We will board our vessel there and sail to Peter I. We expect to have two stations on the air from the vessel operating . . . /MM. We hope to arrive at Peter I around February 6th to begin our 16-day stay. Please remember that these dates are approximate and depend on many variables, including, of course, the weather and sea ice conditions.

One of our goals is to do what we can to help the DX community feel a part of this 3YØX experience. We're going to be enjoying a once in a lifetime adventure, and although it will at times be tough and maybe a little scary, the adventure is something that motivates every member of our team. We want you, the DX community, to enjoy more than just a QSO or two, and be able to live this adventure along with us. In an effort to do that, we are planning daily updates from the island along with photographs of what we are experiencing. In addition, through the technology of Iridium Satellite, we are hoping to provide periodic videos from the island. It seems to us that through video you can experience so much more.

This may be the most expensive DXpedition ever. We solicit your support! Please check out the Peter I website, <www.peterone.com>, and catch up on the news. There are many pictures of our recent training session in Atlanta and of the container packing and shipping. Also, if you want to be a part of the adventure by contributing financially, click on one of the yellow "Contribute" buttons. QSL via N2OO!

Ralph, KØIR, and Bob, K4UEE
Peter I DXpedition Co-leaders

Recent Activity

I noted a lot of activity in the various contests over the past few months, especially on RTTY. It seems that more and more folks are getting into RTTY and finding that it isn't really all that difficult. Quite a number of RTTY contests are listed throughout the year, and you can participate by chasing new countries, having a little fun, or "going for the gold."

Of course, SSB gets the lion's share of activity, but CW is not dead by any means. Personally, I'm looking forward to the CQ WW DX CW Contest in just a few weeks from now as i write this in mid-November. It's always one of my favorites. Once we get into the new year, we'll have the ARRL contests to provide weekend fun, along with CQ contests and other various events to keep our attention.

That is what's coming up in the next month or so. Perhaps we'll have some additional good news for the next issue. Until then, enjoy the chase and remember... Have Fun!

73, Carl, N4AA

contesting

BY JOHN DORR,* K1AR

2006 Contesting Resolutions

January's Contest Tip

It's always tough to decide when to give up trying to dig out a weak one calling you. The problem becomes even more complex as we reach high levels of logging accuracy. My experience is that it's nearly always worth giving the caller every opportunity to work you, unless your rate is so high that this would ultimately compromise your score. Of course, another factor to consider is your ability to hold your frequency while the weaker station is trying to call you. In the long run, however, managing the peaks and dips of QSB can result in a net gain for weak callers (and often new multipliers) and will ultimately put more points on the board for you.

It seems that at this time of year, we resolve to resolve. We plan on a massive weight loss program, commit to joining the gym, arrive at work early, spend more time with our kids, etc. You are likely all too familiar with the drill. For most of our resolutions, achieving consistency past January 15th is the exception rather than the rule.

If you apply the concept to contesting, it turns out we can develop quite an imposing list for us as well. While there is some "tongue and cheek" thinking that has gone into this year's list, I hope it provokes you to at least consider your contesting habits and become a better operator as a result. Beginning with me, there is not a contester on this planet who can't improve and benefit from considering this month's topic. Thus, as contesters, let's also resolve to resolve.

In 2006 I Resolve To . . .

Always sign my entire callsign in every contest. Oh boy, there's nothing more frustrating than having a good run going only to have a loud station come back with only part of his (oR her) callsign. Let's return this practice to the DX nets where it started and leave it out of contesting—please!

Never intentionally take someone else's frequency. This one may seem self-explanatory, but nevertheless it's a good resolution to take to heart in 2006. There is always the challenge of finding precious real estate in a major contest. That said, we also need to be good citizens of our radio spectrum and privileges, and that begins with treating our peers with respect.

Never log a QSO unless I am absolutely sure of the exchange and callsign. This one seems obvious, doesn't it? Recent advances in log checking combined with peer pressure are ensuring that our resolve to improve accuracy in 2006 will be there indeed. Congratulations to all who have improved this year!

Religiously repeat the entire callsign of the station I am working during each QSO. One of the best opportunities to improve your accuracy, repeating a call (especially when you originally only copied a partial) is just great operating technique. It assures the caller that you copied his call correctly and gives him the opportunity to correct your mistake if you got it wrong. As our teenagers often say, "Duh!"

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e-mail: <K1AR@contesting.com>

Calendar of Events

Jan. 1	ARRL Straight Key Night
Jan. 7–8	ARRL RTTY Roundup
Jan. 8	Kid's Day
Jan. 14–15	North American CW QSO Party
Jan. 14–15	Michigan QRP Club CW Contest
Jan. 21–22	Hungarian DX Contest
Jan. 21–22	North American SSB QSO Party
Jan. 28–29	**CQ 160 Meter CW Contest**
Jan. 28–29	REF CW Contest
Jan 28–29	BARTG RTTY Contest
Jan. 28–29	UBA SSB DX Contest
Feb. 4	Minnesota QSO Party
Feb. 4–5	Delaware QSO Party
Feb. 11–12	CQ WW RTTY WPX Contest
Feb. 12	North American CW Sprint
Feb. 18–19	ARRL CW DX Contest
Feb. 25–26	**CQ 160 Meter SSB Contest**

Always verify the callsign of the station I am working from a DX packet spot before actually logging the contact. When working a packet spot, assuming someone else copied the correct callsign is a source of poor operating. K1AR's Law: Assumptions equal score reductions. I'm amazed at how many operators simply use their computing resources to run the contest for them. Whether it's inadvertently operating "out of band" or simply logging a bad callsign, the responsibility for contest accuracy remains with you—no one else!

Submit my logs well before the mailing deadline. With nearly every contest administrator now accepting electronic logs, ignoring this resolution falls into the lazy category. Unless you are one of those "post-contest log massager" types (a topic we need to discuss in the future), use 2006 as a personal benchmark for submitting your contest logs right away! By the way, for the 2005 CQ WW DX SSB Contest over 2000 logs were submitted in the first two weeks after the contest. For you folks, resolution accomplished!

Plan this year's antenna projects during the winter and begin construction on the first warm spring weekend. Working on antennas when it's warm out? Yeah, right! Well, we can try to plan, can't we? I'm actually one of the worst planners when it comes to this topic. Given I don't particularly enjoy antenna work, it's easy to put it off. Ironically, once I get enough motivation to get started, the task rarely is as difficult as I anticipated. Bring on the warm weather in 2006!

Ensure that my entire station will be ready for the fall operating season 30 days before the start of the CQ WW SSB Contest. This one is probably a corollary to the previous resolution. That said, everyone will benefit by a little advanced planning. Hooking up computer networks and voice keyers on Friday afternoon before a CQ WW is a sure path to unnecessary stress and a lower score.

Always solder the ground on my PL-259 connections. Okay, I'm guilty on this one, too. Although a bit of a tongue-and-cheek resolution, proper construction techniques will only make your station better. Solder is the contester's friend. Overall attention to construction details is a lifetime companion.

Answer all of my incoming bureau QSL cards. Well, my pile usually stands at about 1000 unanswered cards at any point in time—better than some and worse than many. In 2006 LoTW (Logbook of The World) and other initiatives are helping us deal with this administrative burden. Banging out just 100 responses per week is another way to attack the problem. Not unlike antenna work, the hardest part of addressing this resolution is getting started. Once you're on a roll, the battle already has largely been won.

Be courteous to my fellow contester. We engage in a competitive environment called contesting, so courtesy sometimes takes a back seat. However, we also owe one another respect, not only when on the air, but when we engage in e-mail or face-to-face dialog. Until the perfect contester is born (and there is none being scheduled at the moment), there will always be something for us to discover about and learn from one another.

Respond to the next *CQ* magazine Contest Calendar survey. Well, I'm not sure how much we need to work on this one, hi! The upcoming 2005 survey results will show that you submitted over 1000 responses this year—nearly double the previous record. Thanks, gang!

Periodically check to see if someone else wants to operate when participating in a multi-op effort. Sure, most of us want the high-rate operating times when participating in a multi-op contest effort. However, a little consideration of others in 2006 will go a long way to your being known as a true team player the next time.

Always act as if I am using MY callsign when operating from someone else's station in a contest. Ah, yes, the "hide behind the call" syndrome. The fact is that whether it's your callsign or someone else's, as contesters we have an obligation to operate responsibly on the air. Do the right thing in 2006!

Final Comments

By taking a few minutes to consider how we can be better contesters and ham radio citizens in general, 2006 should be a good radio year for all of us. There is nothing like the turning of a page to a new year to lead us to be a bit introspective about our approach to the sport. It's my desire that this month's topic will make you think and maybe even identify more resolutions for next year and beyond.

Speaking of 2006, here's to it being a fantastic year for you and your family. We live in a challenging world, and let's do our part to make it a bit better for everyone. 73, John, K1AR

2004 CQ WW DX Contest Results Errata

SSB

The following corrections apply to the SSB contest. The results were published in the August 2005 issue of *CQ*:

F8CFU should have been listed as 21 MHz High Power.

EA2URD was Multi-Single, not single operator. EA4KA finished in second place.

K8IA/7 (not N5LZ/7) should have been listed in the Top Scores in Very Active Zones box as #10.

The Zone 24 record holder in the Assisted category is BA4DW: final score 1,662,520, QSOs 1660, Zones 116, Countries 329.

CW

The following corrections apply to the SSB contest. The results were published in the September 2005 issue of *CQ*:

In the CW trophy winners listing, the Europe 1.8 MHz trophy winner is as follows: SP3BQ (Opr: Andrzej Jarzabkowski, SP8NR).

Also in the CW trophy winners listing, the Europe 3.5 MHz trophy winner is: SN3A (Opr: Bogdan Chorazyk, SP3RBR).

In the line scores, the op for SN3A (SO 3.5 MHz) was SP3RBR, and this was omitted from the listing.

The proper website for CT9M is <www.madeirateam.com>.

The club score of the Central Arizona DX Assn. should have been credited with the percentaged score of 5U5Z. This equals 9,162,977, which when added makes the new total: 14,418,152.

VE3XD's log was left out of the results. His SOAB LP line score was: final score 1,127,175, QSOs 1148, Zones 99, Countries 300. He is a certificate winner.

All-Time Records

The following corrections apply to the All-Time Records, in the October 2005 issue:

Phone, Single Operator/All Band, World Record Holders

AF	EA8BH ('99) (Opr. N5TJ)	25,646,796	10,253	176	692
AS	A61AJ ('04) (Opr. S53R)	15,272,745	7,204	173	622

2004 CQ WW WPX SSB Contest Correction

W1GOU was not listed in the results. He was SOAB LP, #1 in the 1st call district, U.S (99,673 points, 291 QSOs, 203 prefixes).

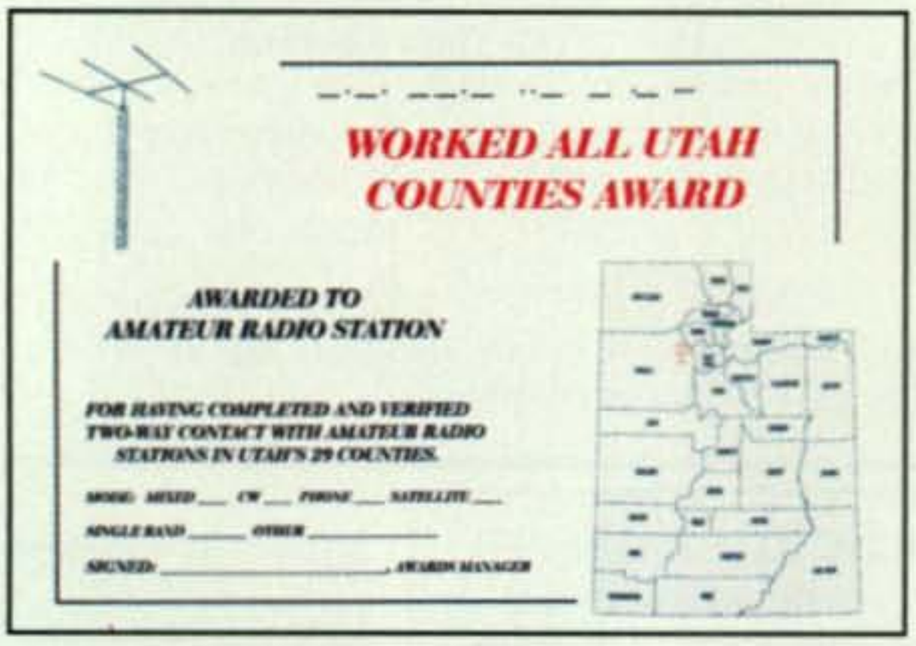
awards

BY TED MELINOSKY,* K1BV

Utah Award Series

Several months ago I listed the states in the U.S. that did not have their own county awards program. The updated list is AL, AK, HI, ID, IL, IN, IA, KS, KY, MI, MO, MT, NE, NM, NV, OR, SD, and TN. Volunteers are still needed to start awards programs in these states. There are many chances for a club or interested individual to fill the 18 gaps.

The latest state county award is from Utah and is sponsored by Ray Friess, WA7ITZ. While the county award follows the traditional multi-level steps from beginning (15 counties) to complete state (29 counties), Ray has also created three additional awards: confirm contact with Utah's 15 largest cities, confirm contacts with the 29 county seats, and work 100 different stations in the state. Ray has kept his fees modest, and the award levels are moderate to challenging.



The Worked Utah award series is sponsored by Ray Friess, WA7ITZ. To earn the Worked Utah Counties Award, work 15, 20, 25, or all of Utah's 29 counties.

Worked Utah Awards Series

General Requirements: All bands may be used, including WARC, VHF, and satellite. Contacts may be made with fixed, portable, or mobile stations as long as the Utah stations are within boundaries of the counties, cities, or county seats. All contacts must have been made from a single location or within a 50-mile radius of the location where the applicant began working toward the award.

SWL okay. Endorsements for single band or mode are available. Contacts may be verified in one of three ways: Send the QSL cards for verification along with sufficient postage to return them, make photocopies of each card and submit with the application, or use GCR rule with verification by two licensed amateurs of General class or higher or by the officer of a local radio club or society. Submit application and fee of $US4 or 4 IRCs to Ray A. Friess, WA7ITZ, 1801 Jennifer Way, Salt Lake City, UT 84116 (e-mail: <utahawards@highstream.net>).

Worked Utah Counties Award. Work 15, 20, 25, or all of Utah's 29 counties. A new certificate will be issued for each subsequent level earned.

Worked Utah's 15 Largest Cities Award. Work and confirm 8 or all 15 of the 15 largest cities in the state. Seven of them are within the boundaries of Salt Lake County, so be sure that the confirmations specifically name the city. The cities within Salt Lake County border on one another, and some stations may use a general QTH of Salt Lake City when they are in one of the other cities, because Salt Lake City is generally recognized around the world. The cities are Salt Lake City, Ogden, Logan, West Valley City, West Jordan, Bountiful, Provo, Layton, Murray, Sandy, Taylorsville, Roy, Orem, St. George, and South Jordan.

Worked Utah's County Seats Award. There are 29 counties in Utah, and each has a county seat (the town in the county that contains county administration and court facilities). The award is available in the same categories as the Worked Utah Counties Award—15, 20, 25, and all 29. QSLs should specifically identify the actual town. The county seats are (county and county seat in parentheses): Beaver (Beaver), Iron (Parowan), Sevier (Richfield), Box Elder (Brigham City), Juab (Nephi), Summit (Coalville), Cache (Logan), Kane (Kanab),

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e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Don Karvonen, K8MFO
USA-CA #1126
September 30, 2005

Jim Clary, ND9M
USA-CA #1127
October 7, 2005

USA-CA Honor Roll

500
DAØBCC.....3361
K8MFO.....3362

1000
K8MFO.....1701
K8XF.....1702

1500
K8MFO.....1425

2000
K8MFO.....1319

2500
K8MFO.....1239

3000
K8MFO.....1149

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

Bob Schrader, AA9GZ
USA-CA All Counties #1122, May 21, 2005

Yavapai, Natchitoches, Pasquotank, and Schuylkill?

By Bob Schrader, AA9GZ

What the heck is a Yavapai, Natchitoches, Pasquotank, or Schuylkill? They are all U.S. counties. Being a county hunter, you become familiar with names such as these, as they are all a part of the political structure of the U.S., each being a distinct political entity. There are 3077 counties in the United States, including Alaska and Hawaii. In Louisiana they have parishes instead of counties, but they are the same divisions as counties as in the balance of the U.S.

Alaska is divided into districts, and Hawaii has one (uninhabited) island which also is designated with county status. This county is "run," or put on the air for hams to contact, when a radio operator charters a boat, packs provisions for the day, takes an armful of batteries, and spends the day making the island "radioactive." That's because the island has no inhabitants, no commercial power supply, no restaurants, and no hotels. So when someone announces that he or she will be putting out Kalawaeo, Hawaii *on a specific* date, you make every effort to be on frequency when and if he or she comes up. Sometimes the propagation stinks and you need to be very resourceful and use the full band of frequencies available to your license class to be able to make that QSO. Sometimes it just doesn't work out, and you sit for several hours and gnash your teeth.

That is why garnering all 3077 counties can take years to accomplish and be quite aggravating at times. I have been at this goal for eight years, but have enjoyed each hour sitting and monitoring the county hunters' nets on 20 and 40 meters. When propagation makes SSB unworkable on 20 or 40, then CW is the answer. These guys put out counties while driving down freeways using a telegraph key, and they are very proficient at it.

Sometimes even successful contacts can be frustrating. Often the mobiles who are driving from county to county and state to state will work hundreds of hams wanting the particular county the mobile station is putting out, and it may be one that you desperately need to complete a state in its entirety. You work him and send a QSL card only to get a "sorry, not in the log" in response. What happened? A driver going down the freeway at 70 mph cannot be expected to log his contacts by hand, so a small tape recorder is often used, and the ham transcribes the data into his log at the end of the trip to enable him to respond to QSL requests. Occasionally a QSO is missed, resulting in a "not in log" response. What can you do? Just wait for someone else to drive into that county at a later date and try again to make a contact and get a confirmation.

For award purposes, each QSO must be confirmed via a QSL card stating the time, call, date, and county, and of course, it must have your call on it. I have a shoebox full of confirmations with all the information on them. The award manager will generally ask an applicant for the USA-CA All Counties Award to submit five cards of his choosing to check. This careful monitoring keeps everything on the up and up, and helps maintain the integrity of the award.

So now you know about county hunting and the way it works.

I was first licensed in 1983 after much urging by members of a local radio club after they found out that I had previously served aboard a U.S. Navy ship as a radioman and that I was very proficient at copying CW up to speeds of 50 to 60 words per minute. They just wouldn't let me *not* become a ham.

My main interest in radio is DXing, using my ICOM IC-706 MkII transceiver and Cushcraft R8 vertical antenna. I get a big charge out of being able to work another ham in some far-off place that I may never have heard of, and then to receive his unique and interesting QSL card in the mail to confirm our contact. I recently received a QSL card from Rwanda for a contact that I had made seven years ago! It was a new one for me and I was glad to receive it, even if it did take seven years.

While DXing is my primary interest, I was tuning the dial one day several years ago and stumbled upon the county hunters' net and that's all it took. I knew of another county hunter in my radio club and he really got me excited about it. He is number 859, Noel Beardsley.

My biggest challenge was acquiring my last county, Adams County, Idaho. I waited months for this one. There are no hams in Adams and that necessitated someone driving into the county to enable me to get it. Finally, George Courtney, NA7W, who lives in Washington, drove over into Adams County, Idaho after work one afternoon and that finished up things for me. I am very appreciative of his efforts and thank him for going out of his way to help me out.

Also, I must mention that after "going around once," there are people who start all over again, and some are working on their "fifth time around." That's contacting all 3077 counties five separate times! That makes me wonder if they're still married, as it does require lots of time. However, county hunting is very infectious once you've been bitten by the bug. Don't start if you're not serious about completing your goal.

Finally, I should tell you that just over one thousand hams worldwide have accomplished this task, so it is somewhat of an exclusive fraternity. I am number 1122.

—73, Bob, AA9GZ

PRESENTED TO
AMATEUR
RADIO STATION

FOR HAVING SHOWN
PROOF OF CONTACT
WITH ___ OF THE 15
LARGEST CITIES OF
UTAH

The cities are:

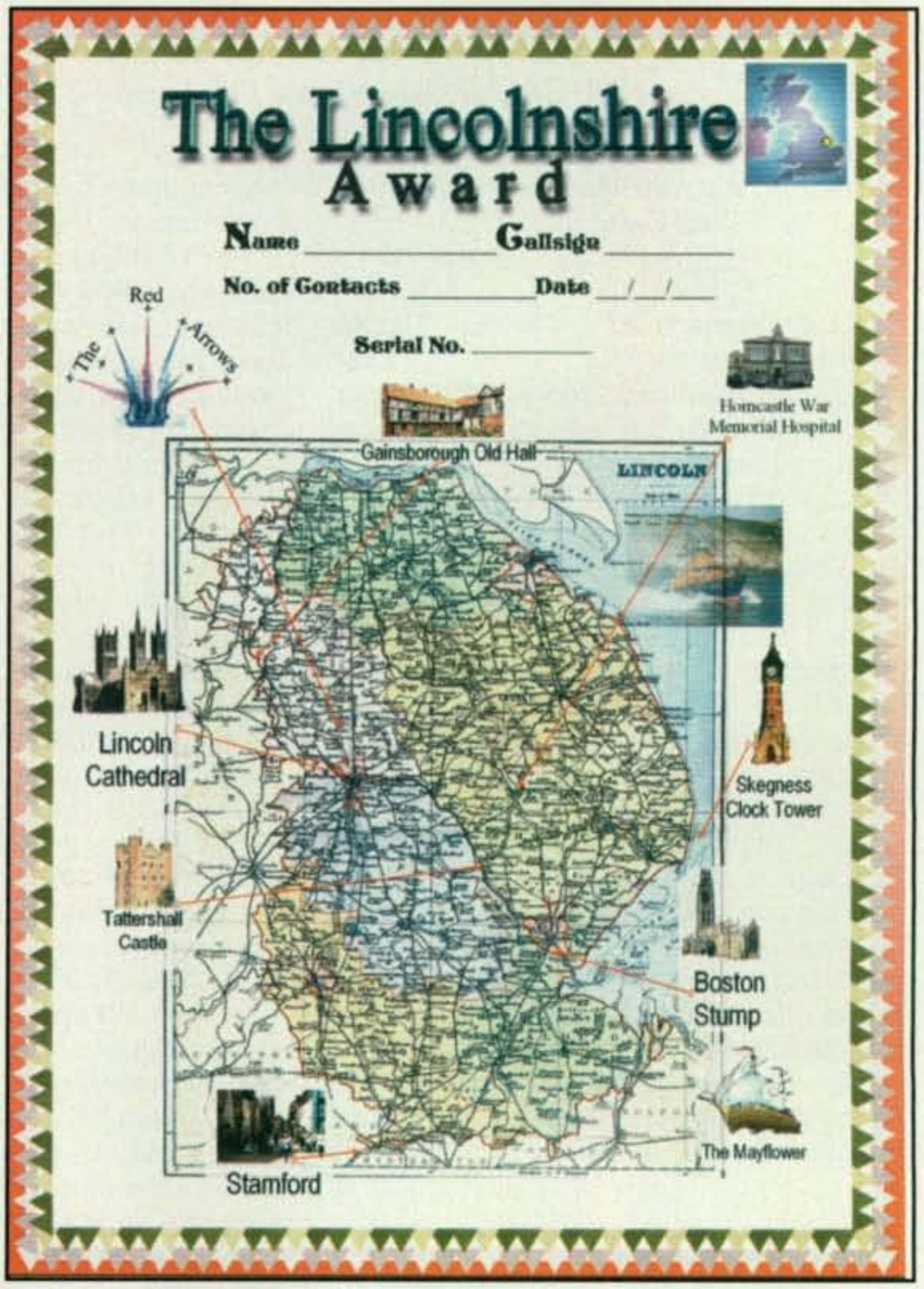
1. Salt Lake City	6. Ogden	11. Logan
2. West Valley City	7. West Jordan	12. Bountiful
3. Provo	8. Layton	13. Murray
4. Sandy	9. Taylorsville	14. Roy
5. Orem	10. St. George	15. South Jordan

Mode: Mixed ____ Cw ____ Phone ____ Satellite ____

Single Band _____ Other _____

_____ Awards Manager

The Worked Utah's 15 Largest Cities Award requires working and confirming 8 or all 15 of the 15 largest cities in the state.



The Lincolnshire Award is sponsored by the Thorpe Camp Museum Radio Station. See text for details.

UTAH COUNTY SEATS
AWARD

AWARDED TO
AMATEUR RADIO
STATION

FOR HAVING COMPLETED AND CONFIRMED TWO WAY RADIO CONTACT WITH AMATEUR RADIO STATIONS LOCATED IN ____ OF UTAH'S 29 COUNTY SEATS.

MODE: MIXED ___ CW ___ PHONE ___ SINGLE BAND ___

OTHER _____

SIGNED: _____ AWARDS MANAGER

COUNTY SEATS WORKED IN RED

Beaver (Beaver)	Box Elder (Brigham City)	Cache (Logan)
Carbon (Price)	Daggett (Manila)	Davis (Farmington)
Duchesne (Duchesne)	Emery (Castle Dale)	Garfield (Panguitch)
Grand (Moab)	Iron (Parowan)	Juab (Nephi)
Kane (Kanab)	Millard (Fillmore)	Morgan (Morgan)
Piute (Junction)	Rich (Randolph)	Salt Lake (Salt Lake City)
San Juan (Monticello)	Sanpete (Manti)	Sevier (Richfield)
Summit (Coalville)	Tooele (Tooele)	Uinta (Vernal)
Utah (Provo)	Wasatch (Heber)	Weber (Ogden)
Washington (St. George)	Wayne (Loa)	

There are 29 counties in Utah, and each has a county seat. The Worked Utah's County Seats Award is available in the same categories as the Worked Utah Counties Award—15, 20, 25, and all 29.

Tooele (Tooele), Carbon (Price), Millard (Fillmore), Uinta (Vernal), Daggett (Manila), Morgan (Morgan), Utah (Provo), Davis (Farmington), Piute (Junction), Wasatch (Heber), Duchesne (Duchesne), Rich (Randolph), Washington (St. George), Emery (Castle Dale), Salt Lake (Salt Lake City), Weber (Ogden), Garfield (Panguitch), San Juan (Monticello), Wayne (Loa), Grand (Moab), and Sanpete (Manti).

The Worked Utah Century Club Award. Contact Utah stations per the requirements listed below. All modes and bands permissible.

Bronze: Work and confirm a minimum of 100 stations in Utah. These can be Utah residents, mobiles passing through, or portable stations temporarily in Utah.

Silver: Work and confirm a minimum of 100 stations whose permanent QTH is in Utah. One contact required from each of the 29 Utah counties.

Gold: Work and confirm a minimum of 100 stations whose permanent QTH is in Utah. One contact required from each Utah county seat.

Those who qualify will receive both the Century Club Award and the County Seat and All County Awards as well (or all three). A certificate or plaque will be made available in the future.

DX Awards

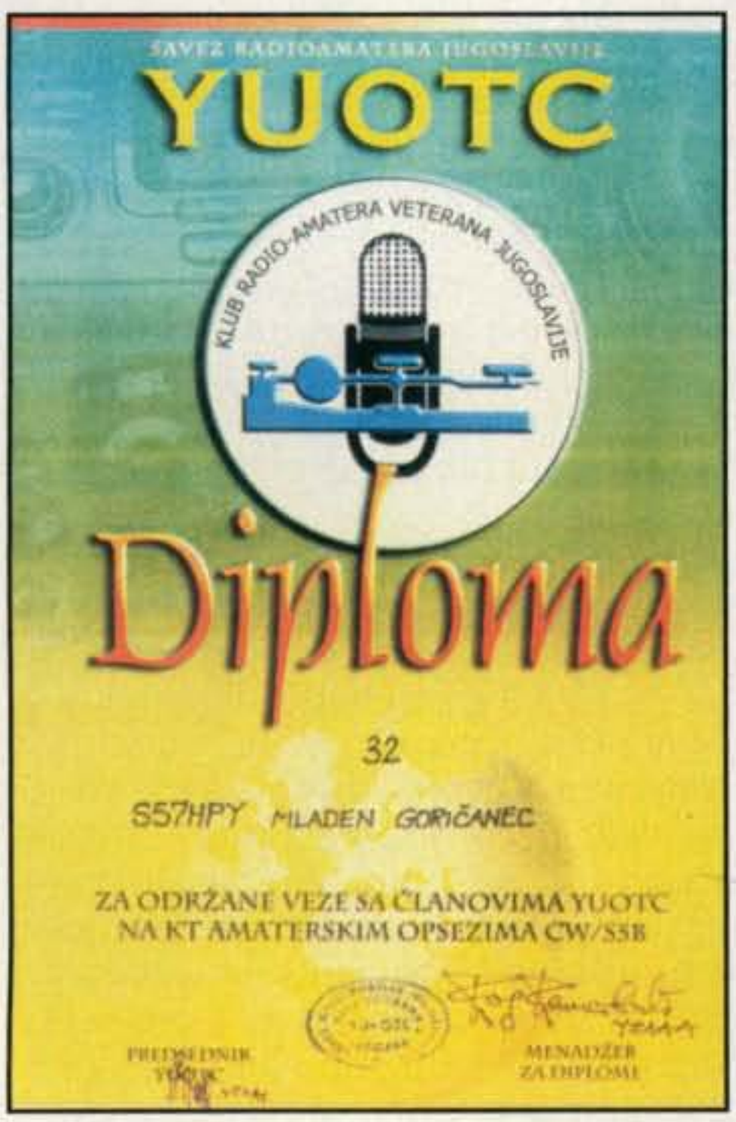
England's Lincolnshire Award. This award is sponsored by the Thorpe Camp Museum Radio Station. When the sample of the Lincolnshire Award was sent to me via e-mail, my

dial-up connection just about burned itself out. It took a half hour of downloading and almost 4 megabytes of space for the image. The picture you are seeing in the magazine cannot begin to show the intricate detail of the map of Lincolnshire county and of the miniature images of the local places of interest. Familiar names of cities shown on the map include Lincoln, Boston, and Stamford, all of which were recycled in the New World by the English settlers who emigrated to America in the 1600s and 1700s. Tony, G3ZPU, explains that while the award fee is on the high side, any excess monies collected will be given to the Thorpe Camp Radio Museum Station and the National Youthbike Project.

The award is available to all amateurs. Submit a log extract showing contacts made from the county of Lincolnshire as follows:

Lincolnshire—15 contacts
England—10 contacts.
All others—5 contacts

All contacts must be made via radio, and not internet modes. No date limitation. *No cards needed*, just a log extract showing call, date, band, mode, and signal reports. Send the list plus fee of £5, $US10, or 10 Euros to: Tony Nightingale, G3ZPU, 42 Spilsby Road, Horncastle, Lincolnshire, England LN9 6AW (e-mail: <tony@radioman.e7even.com> or <g3zpu@hotmail.com>).



The Yugoslavian Old Timers Club offers this award for contacting its members.

Yugoslavia's YU-OTC Award. A number of countries have established formal or informal associations of old timers (usually those licensed for 25 or more years). They've seen a ot over the years, from tubes to transistors to integrated circuitry, from trans-atlantic communication to space communication. The YU Old Timers Club offers this award for contacting its members. The cost is reasonable and requirements are modest. It's a good target for the beginning awards hunter.

Contacts with members of the club must have been made after 29 June 1998. Each member counts once; no band-mode limitations. EU stations need 10 different members; DX 5. Send GCR list and fee of $US5 or 5 IRCs to: Rodoljub Rankovic, YZ1AA, P.O. Box 17, 11550 Lazarevac, Yugoslavia.

YU OTC members: **YT1**AA, AC, AD, AT, LS, MM, SO, SS, PBV, OXO, VM, NM, MR, ANR, PRR, EBR; **YU1**AA, AD, AN, AR, CP, DR, DT, DV, ED, EO, GO, HB, IJ, IR, JU, KC, KH, LW, MI, MK, MM, NB, NM, OF, OK, QQ, QX, SC, SM, SY, TO, YB, UR, VK, VM, VN, WF, XM, YO, ZZ, XI, AW, RB, XW, DN, ET, PH, VS, PC, PW, EFG; **YU6**AB, CC, DZ; **YU7**AH, LP, RN, VI, ZJ, YR, KO, OP; **YZ1**AA, EZ, SL, EV, ZE, SLB; YZ4AA; **4N1**DV, RS, JB; **4N7**EC, TF; **YU4**NS, SM; **YT4**KA, VK; YU8DX; DL5MEO; OE2KBP; OE3VID/ZY1ID; Z32DY; and S57HPY.

Looking for award publicity? *CQ* is the only U.S. amateur magazine with a monthly awards column, and I'm always looking for the details of new, interesting awards.

73, Ted, K1BV

Oops...

K4TWJ's October "How it Works" column contained an error regarding the filament voltage for the tube in the one-tube "TNT transmitter" featured in the article. The #10, 210, or 245 tube usable in that circuit requires a filament voltage of **2.5 volts**, not 7.5 as published. Applying 7.5 volts to the tube filament will burn it out. We regret any inconvenience due to this error.

vhf plus

BY JOE LYNCH,* N6CL

How to Rejuvenate Your Club

Ah, yes, it's New Year's resolution time! As you look back on last year, you may wonder how your local amateur radio club survived the year. With membership drop-off and other distractions, fewer and fewer people are now attending those monthly meetings—and with good reason. Those meetings are getting more and more boring! Why? It's usually because the same old hams are hanging around the same old clubhouse talking about the past.

You know the conversation. Someone starts it by saying, "I remember that great aurora of 1989—or was it 1987?" Someone else picks up the conversation, and the rest of the club meeting time and discussion are consumed by nostalgia. Whatever the year or the propagation event that is under discussion, it really doesn't matter. The routine is the same: a recitation of all of those contacts made, whether real or imagined, during the hours of the occurrence of that great past event.

Let me say from the outset that I guarantee that this type of meeting will not rejuvenate your club. You have to have a plan in order to make the club active and viable. Here is my plan:

Most change processes attack the problem from the point of the problem. That is, the problem is identified and then people brainstorm various solutions to the problem until the solution with the most noise gets adopted—sometimes only to quiet the noise-making supporters. The problem with this method is that rarely is there buy-in by the whole group, because it isn't the group's idea. There is another approach that does have buy-in because of its approach and the process by which it is carried out. It is called Appreciative Inquiry, or AI.

The AI process originated in the mid 1980s as a research idea for a dissertation for David Cooperrider, a PhD candidate at Case Western Reserve University. Subsequent to his successful defense of his idea and earning his PhD degree, Cooperrider and many others have taken the AI process all over the world with great results. Unlike other change processes that focus on the problem, the AI process focuses on the positive and builds from that approach. Here is how it can work for your club.

In its most commonly used form, there are four components to the AI process: discovery, dream, design, and destiny. As with differing components, there are also differing methods for bringing about the process. Here is how I see it working for your club. I recommend that you lead your club through each of these four components as stages during a set of four regularly scheduled meetings.

There is something very important that must be done before getting started, however. In order for the process to work, there must be buy-in of the process by a significant majority of your active members—that means those who regularly attend your club's meetings must also be on board with the process. Therefore, before you get the process under way for your club, you might want to have a night of introduction when you explain what is happening. Then at the end of your presentation it is important that your club adopt the plan for implementing the process by way of a vote. If you have done your job of selling the idea by bringing in success stories of other organizations having used the process, then chances are pretty good that you will have a positive vote and subsequent buy-in of the process by a majority of your members. Next it's time to run the process via your subsequent club meetings.

In the discovery process you find out what it is about your organization that made you feel really good in the past. Through a process of questioning, you articulate these components or events that proved positive for you. It may be when you had design nights and different projects were presented for your members to consider building for their stations. One method of working this process is to have everyone write out his or her response on a slip of paper and then hand in those slips of papers. In your next newsletter you print those responses, being sure to leave out the name of the originator of the response.

In the dream process you dream about a positive future for your organization and what you might do to bring about that future. A two-part question you might ask is, "What if you had a dream and in that dream a miracle occurred? What would that miracle be and what part would you play in bringing about that miracle?" A response might be refilling the clubhouse building, and the part that you play is asking someone to come to the next meeting. Again, you ask the participants to write down responses to your question and hand them in. As with the previous month, you publish the responses, again leaving out the identity of the respondent.

It is from this dream process that you have the elements for developing the design process. During this club meeting you elicit ideas for designing a program to bring about the dream that seems to

*e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

Jan. 1	Moon Perigee. Poor EME conditions.
Jan. 3	*Quadrantids* Meteor Shower Peak.
Jan. 6	First Quarter Moon.
Jan. 8	Moderate EME conditions.
Jan. 14	Full Moon.
Jan. 15	Moderate EME conditions.
Jan. 17	Moon Apogee.
Jan. 21–23	ARRL VHF Sweepstakes. See text for details.
Jan. 22	Last Quarter Moon. Poor EME conditions.
Jan. 29	New Moon. Moderate EME conditions.
Jan. 30	Moon Perigee.

—EME conditions courtesy W5LUU.

have emerged as the most dominant dream. For example, your dream might be how to become more involved in the VHF-plus community as a whole. Various ideas might emerge pertaining to how this might be done. Again you collect these ideas on slips of paper and publish them in the next month's newsletter. It is at this point you and your members have a pretty good idea of what they want to do as a club and how to go about implementing the plan.

Let's assume that your club's idea is to become more involved in the VHF-plus community. Emerging from your design meeting might be several ideas in order to implement that goal. One of those ideas might be contacting the organizers of the Microwave Update to see about becoming a host club for the next annual meeting. For the past several years the Microwave Update people have had successful meetings in various parts of the country, with the last one being hosted by the San Bernardino Microwave Society. I know that they will be looking for venues for future meetings for several years to come, and your club meeting place might be the right location for a future meeting.

Another organization is AMSAT. Last September in the aftermath of Hurricane Katrina, AMSAT scrambled to find an alternate site to Lafayette, Louisiana for their annual meeting. In the end they scrapped the major meeting, opting for an abbreviated Echolink-based conference. If your club had already explored the options for being a venue for a conference, then maybe your club could have filled the void in the aftermath of the hurricane.

In the destiny process you bring together all of the ideas and you begin to realize that you have a decent idea of where your club is headed in its future—its destiny. It is at this point when you focus on continuing the process, because as it was in the beginning, it will again be necessary for the vast majority of your active members to buy into what is the outcome of the process. Without such buy-in it will not succeed.

In the aftermath of the process is the necessity of putting members to work in bringing about the design. For example, if it is your destiny to become a venue for an organization's annual meeting, then a committee needs to be put to work to deal with the particulars, such as finding an appropriate hotel or motel for the location, finding out the tourist attractions in the area, checking on transportation issues, etc.

There is one caveat in this change process: If your club's decline is as a result of unresolved conflict in its past, then that conflict will need to be addressed. A possible way of doing this is by way of outside mediation. To find a mediator I would start at your local law school. Sometimes mediators are willing to work *pro bono,* meaning without charging a fee for a community organization that cannot pay for such services.

For more information on AI, I suggest you read the *Appreciative Inquiry Handbook* by David Cooperrider, Diana Whitney, and Jacqueline M. Stavros (Bedford Heights, Ohio: Lakeshore Publishers, 2003). I recommend the premium edition (ISBN: 1893435172), because it includes a CD with a PowerPoint presentation. It is the most exhaustive book on the market today pertaining to the AI process.

I wish you success in your use of the AI process, because I believe that as goes the success of the local club so goes the success of the future of our hobby. Should you decide to use this process, please let me know so that I can tell your story here in this column, or in our sister publication *CQ VHF* .

A Sleeper Handheld and a Neat Mobile Radio

From ICOM comes two radios worth looking into. They are the IC-T90A handheld and the new IC-7000 mobile radio. The handheld sells for about $260 and the mobile radio sells for around $1500 at most of the ham radio stores around the country.

Bud Davis, KA9YPS, a friend of my wife, Carol, W6CL, clued her in about the IC-T90A, pointing out a feature in which they both have an interest—CW readout of the display. This feature makes this radio's frequency display uniquely accessible to them, because they are both visually impaired (Carol is totally blind). Incidentally, the European version is the IC-E90A. There is a short write-up about it at the British URL <http://www.southgatearc.org/news/october2005/ic-e90.htm>. In addition, there is a quick user's guide for this radio written for the visually impaired ham at <http://icanworkthisthing.com/docs/amateur_radio/handheld/IC-T90A%20quickguide.shtml>.

Here are some of the features, starting with the Morse code readout. It is programmable to send Morse code at the rate of between 10 and 25 wpm. It is ironic that in the days of all of the talk about the elimination of the Morse code requirement from our license examinations, here is an incentive for our fellow hams who are visually impaired, or

maybe a bit challenged in seeing the small digital display, to learn Morse code, or at least the numbers so as to know what is being sent.

For that matter, I think it would be a good idea for all of us to learn Morse code as part of our becoming well-trained ham radio operators. For emergency communications, it is the method of communication that can be used when other means of communication have failed. Also, despite the inroads of the WSJT software for EME communications, CW is still used by a number of diehard EME enthusiasts to make contacts off the moon.

Here are some of the other features of the IC-T90A: It has a wideband receiver, with a frequency range between 495 kHz and nearly 1 GHz. It can receive on AM, FM, and WFM. It has pre-programmed TV memories. Its Dynamic Memory Scan (DMS) bank features 555 alphanumeric memory channels, including 50 band edges and 5 call channels.

With the supplied 1300 mAh lithium-ion battery pack (BP-217) you can run 5 watts. The low-power option is one-half watt. In the receive mode you can use this radio for more than five hours. The downside to this mega battery is the initial charge time—15 hours! You had better buy a spare battery for when you totally discharge it, which at $100 isn't cheap. The BC-139 desktop charger gives you a quick recharge of about two hours. However, at $90, this charger also isn't cheap. A really inexpensive alternative is the BP-216, which is a holder for two AA-type batteries. The downside to this alternative is that the radio will only transmit at one tenth of a watt. The BP 216 sells for about $36.

It is interesting that this radio has been around for more than three years and Carol only recently learned about it from her friend. As this is being written before Christmas, you can be sure that for our gift giving, one will be under our Christmas tree.

Next up, while the IC-7000 mobile radio is an HF radio, it also includes the 50-, 144-, and 430-MHz VHF/UHF bands. On the VHF-plus ham bands its power output is 100 watts on 6 meters, 50 watts on 2 meters, and 35 watts on 70 cm.

What is most intriguing to me is the 2.5-inch color TFT screen of the IC-7000. Initial reports indicated that some versions of this rig would be capable of receiving the VHF TV channels and projecting the picture onto this screen. However, I have not seen any indication that the model now available on the U.S. market is capable of receiving these signals. The receive specifications include capability of receiving signals up to almost 200 MHz. If it were capable of receiving the VHF TV stations, it does not go high enough to cover channels 11–13, as channel 11's band starts at 198 MHz and channel 13's band ends at 216 MHz.

While I am not particularly concerned about the VHF TV stations, I am interested in ATV signals. The commonly used 70-cm ATV frequencies are 421.25, 426.25, 427.25, 434.0, and 439.25 MHz, all of which are within the 400–470 MHz advertised receive specifications for the IC-7000. It would seem that if the radio is advertised to receive TV signals on VHF, it should also be able to receive these same TV signals on UHF. Even so, I have yet to be able to get a clear answer to my questions concerning ATV reception.

Should it have the capacity to receive ATV, it could be a great mobile radio for things such as tracking a launched balloon that has as part of its payload an ATV transmitter.

Incidentally, the rig does have a video output jack so that what is displayed on the screen can also be displayed on a bigger screen. Do you have a built-in screen on your car's dashboard? If there is an input jack for that screen, then you can display the screen output to that screen, thereby giving you a much larger view of the display. For some of the vehicles equipped with a DVD player, this can also serve as a display for the radio, although most OEM DVD players are located out of the driver's view for both safety and legal reasons.

For my wife, Carol, W6CL, and her fellow visually impaired friends, the rig has a built-in voice synthesizer. I am glad that ICOM is taking the initiative to make this feature standard. Prior to this one would have to purchase the synthesizer and install it as an accessory.

The ICOM IC-T90A handheld features CW readout of the display.

Other nice features of the radio include the removable head and the remote-control microphone that plugs into the removable head. We own the Kenwood TS-480 and it is a bit awkward to have to plug the mic into the rig and not the remote head. This inconvenience requires routing a very long mic cable through the car to the front seat. Thankfully, this is not the case with the IC-7000's remote head.

For mobile operation the rig features a 16-step digital noise-reduction control and a 100-step digital noise-blanker control, with the level and width both being adjustable so as to as near as

The ICOM IC-7000 mobile radio is an HF rig that also includes the 50-, 144-, and 430-MHz VHF/UHF bands.

possible eliminate pulse-type noise such as engine ignition and sparking.

The rig also has a top-drawer IF DSP, incorporating ICOM's latest version in this radio. In other words, insofar as signal processing is concerned, you will be hard pressed to tell the difference between this radio and one of the company's high-end radios, such as the IC-756 PRO III or the IC-7800.

The IC-7000 also boasts digital IF filters. From its brochure:

> All the filters you want at your fingertips! You will never have to purchase *"Optional"* filters as the IC-7000 has adjustable digital filters. You just dial in the width you want and select whether you want a sharp or soft filter shape for SSB and CW modes. Then to pull-in the weak ones, with a quick turn of the concentric twin PBT knobs, you can either narrow the IF passband, or shift the entire passband to eliminate the QRM.

Other features include selectable SSB transmit bandwidths and a direct digital synthesizer (DDS) circuit that improves the C/N ratio, providing a clear, clean transmit signal in all bands. New to this radio is ICOM's two-point manual notch filter (MNF). ICOM boasts being able to apply 70 dB of rejection to two signals at once. The notch width is adjustable—wide, medium, and narrow—and an auto-tuning notch filter is available.

Finally, for the serious Rover contester, the IC-7000 has a digital voice recorder (DVR) that allows you to have four transmit playback memories, and up to 25 minutes for recording incoming signals. This means that while you are driving fast and furious to your next grid location, you can be giving out QSO points and recording your contacts for later transcription. Just remember your start and stop times, which you can read from your digital display.

With all of these bells and whistles, I would imagine that this radio has huge potential for EME operations, both for the included bands, and also as an IF for other VHF-plus bands. As I write this in mid-November, I am hoping that there is one of these radios under my Christmas tree! If there is, I will definitely be reporting on its performance later this year.

Current Contest

January: The ARRL VHF Sweepstakes is scheduled for the weekend of January 21–23, 2006. Here is a contest that will get you out of the house in the dead of winter to have some great fun. Don't let that word "sweepstakes" fool you. Unlike its HF counterpart with the preamble message style exchange, the exchange is the same as any other VHF contest—your callsign and grid locator. For the complete contest rules, see the December 2005 *QST* or the ARRL's URL: <http://www.arrl.org>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, email, etc., please contact the person listed with the announcement. The following organization conference organizer has announced a call for papers for itsa forthcoming conference:

EME Conference 2006: The EME Conference 2006 will be held in Wuerzburg, Germany on August 25 to 27. Interested authors are invited to present a paper(s) for the EME Conference 2006. Electronic submissions in Word97, Word2000, Acrobat5 (PDF), or text format will be accepted by e-mail or on CD. Please ask if you are using another format.

If you are interested in writing and/or presenting a paper for this conference, send an e-mail to Rainer Allraun, DF6NA, at: <df6na@df6na.de>. Please contact him as soon as possible with an abstract or even a general idea. This will help the conference team with its planning activities. For more information about the EME Conference 2006, see: <http://www.eme2006.com>.

Current Meteor Shower

The *Quandrantids*, or *Quads*, is a brief, but very active meteor shower. The expected peak is around 1620 UTC on January 3rd. The actual peak can occur three hours before or after the predicted peak. The best paths are north-south. Long duration meteors can be expected about one hour after the predicted peak. For more information on this meteor shower prediction see Tomas Hood, NW7US's propagation column elsewhere in this issue. Also visit the International Meteor Organization's website: <http://www.imo.net> for information on this shower as well as an outline for the whole year.

And Finally . . .

As we look into the future of the New Year, let us also look back at what we accomplished this past year. Many of us did so much for public recognition of our hobby by way of our participation in emergency communications. Many of us did our part by staying out of the way of emergency communications. We still have much to do, however, to make our hobby known for all the good that it has to offer. Let's make it our New Year's resolution to keep doing good work, while at the same time having lots of fun in the process of learning more about our great hobby.

Until next month...

73 de Joe, N6CL

propagation

BY TOMAS HOOD,* NW7US

Good Conditions for 2006

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, October 2005: 9
Twelve-month smoothed, April 2005: 32

10.7 cm Flux
Observed Monthly, October 2005: 77
Twelve-month smoothed, April 2005: 96

***Ap* Index**
Observed Monthly, October 2005: 7
Twelve-month smoothed, April 2005: 16

Here is an overview of expected propagation conditions for 2006 on each amateur band between 6 and 160 meters.

6 Meters: About the only real action on 6 meters will be during the summer season's troposcatter and sporadic-*E* activity. Aurora will play a minor role during spring and fall. Meteor-scatter propagation might offer an occasional peak in activity, as well.

10 and 12 Meters: These bands will be fair to poor, except during times of sporadic-*E* activity. Expect most DX openings to be predominantly on north and south paths. Most of the time the solar activity will not support propagation at higher bands, except for possible openings on paths between lower latitudes and locations on the other side of the equator (north/south paths).

15 Meters: This band will be fair during the first part of the year, with occasional worldwide openings during the daylight hours of all seasons. Most openings, though, will be short, except for the strong and frequent north/south path openings. By the end of 2006 we should be at the very bottom of the cycle, if not at the end, so this band will rarely be open for worldwide DX.

17 Meters: This band should behave much like 15, but you will find it open more often, with it remaining open for DX an hour or two longer than 15 meters.

20 Meters: This band is going to be the main player during this year of low solar activity. Expect fair conditions during the daylight hours, with DX openings possible to limited areas throughout the year. DX conditions on this band tend to peak for a few hours after local sunrise and again during the sunset period.

30 Meters: As Cycle 23 sees its completion at the end of 2006, activity on this band will offer moderate openings, especially a few hours before sunset until a few hours after sunrise. In 2005, 30 meters will be an exciting band for those low-power digital signals. Winter brings longer nights, providing the right mix for exceptional worldwide DX.

40, 60, 80, and 160 Meters: These are nighttime DX bands. Great worldwide DX should continue on 40 meters from about two hours before sunset to approximately two hours after sunrise during all seasons. Expect coast-to-coast DX in 60 meters. DX openings on 80 and 160 should peak during the early spring, late fall, and winter months. Expect somewhat stronger signals than those of last year.

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for January 2006

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-5, 9-14, 17-20 23, 28-31	A	A	B	C
High Normal: 6-8, 16, 21-22, 26-27 21-24, 26-28, 30	A	B	C	C-D
Low Normal: 15, 25	B	C-B	C-D	D-E
Below Normal: 24	C	C-D	D-E	E
Disturbed: None	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be excellent (A) on Jan. 1st through the 5th, good (B) on the 6th to the 8th, fair to good (C-B) on the 15th and 25th, etc.

January Propagation

It should be a toss-up between 17 and 20 meters for some great DX propagation openings during the daylight hours. These bands should open to most areas of the world, often with very strong signals. Seventeen meters may have a slight edge before noon, with 20 meters taking the lead after noon and becoming optimum DX band during the late afternoon hours. Short-skip openings between distances of about 1200 and 2300 miles should be excellent during the daylight hours. Excellent short-skip openings are expected on 15 and 17 meters from shortly after sunrise through the early evening hours for distances between 1000 and 2300 miles. Twenty meters is expected to be a solid band with openings for both DX and short-skip. DX conditions should peak during a window of an hour or so right after sunrise and again during the late afternoon and early evening hours. Short-skip openings between approximately 1300 and 2300 miles should be possible from just after sunrise to as late as midnight. Shorter distance openings should also be possible from mid-morning to mid-afternoon.

The optimum band for DX conditions during the hours of darkness should be 40 meters. Expect openings to most areas of the world from shortly before sundown, through the hours of darkness, and until shortly after sunrise. Signal levels may be

exceptionally strong at times. During the daylight hours, short-skip conditions should be optimal for openings between approximately 100 and 600 miles. Skip will lengthen during the late afternoon, and by nightfall short-skip conditions should be optimal for openings between 800 and 2300 miles.

Expect 60 meters to play a significant role in nightly DX across the United States. With very low noise levels this month, the weaker signals of 60 meters will be easy to copy.

Because atmospheric noise levels will be at seasonally minimum levels in the Northern Hemisphere during January, the 80- and 160-meter bands should also be hot. Expect some good openings to many parts of the world on 80 meters during the hours of darkness and the sunrise period. Short-skip openings between distances of 50 and 250 miles should be optimal on 80 meters during the daylight hours. During the later afternoon and early evening hours short-skip openings should increase to between 250 and 1500 miles, and by nightfall openings up to and beyond 2300 miles should be possible.

Expect some DX openings on the 160-meter band during the hours of darkness. Openings towards Europe and the east should peak at about midnight. Openings towards the South Pacific and in a generally southerly direction, as well as openings into Asia and North Pacific, may be possible just before daybreak. Short-skip openings up to 1300 miles should be possible during the hours of darkness, and frequently the skip will extend out as far as 2300 miles. During the daylight hours intense ionospheric absorption will severely limit openings, although some may be possible at times up to 150 miles or so.

VHF Conditions

Sporadic-*E* can occur during January, so be on the lookout. This has happened right around New Year's Day and that week. After that, it is rare.

The *Quantrantids* meteor shower is the major meteor shower for January and appears from January 1 to January 5. The maximum should occur at 1820 UTC on January 3. This shower can sometimes be quite intense, so it may be a good idea to set up some 2- and 6-meter schedules. Morning meteor openings may be the best bet during this month. The hourly rate can be as high as 200 this year, although the expected average is about 120. View <http://www.imo.net/calendar/2006> for a complete calendar of meteor showers in 2006.

Looking Ahead in CQ

Here's a look at articles we're working on for upcoming issues of :

- "Beacon in a Box," by Jim Southwick, N7JS
- "Belgrade & BURABU—Hamfests in Eastern Europe," by George Pataki, WB2AQC
- "A Compact & Effective 40–10 Meter Portable Station," by Phil Salas, AD5X

Do you have a ham radio story to tell? See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com/ guide.html>.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 kw PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
January & February 2006
Local Standard Time at Path Mid-Point (24-Hour Time System)

Band (Meters)	*Distance From Transmitter (Miles)*			
	50-250	250-750	750-1300	1300-2300
10	Nil	Nil	10-15 (0-1)	10-15 (1) 15-16 (0-1)
15	Nil	10-16 (0-1)	08-10 (0-1) 10-15 (1-2) 15-16 (1) 16-18 (0-1)	08-09 (1) 09-10 (1-2) 10-15 (2-3) 15-16 (1-2) 16-18 (1) 18-19 (0-1)
20	Nil	08-10 (0-1) 00-12 (0-2) 12-14 (0-3) 14-16 (0-2) 16-22 (0-1)	06-07 (0-1) 07-08 (0-2) 08-10 (1-4) 10-12 (2-4) 12-14 (3-4) 14-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (4) 16-17 (3-4) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-11 (3) 11-15 (3-4) 15-16 (3) 16-18 (1-2)	07-08 (1-2) 08-09 (1-3) 09-11 (3-4) 11-15 (4-3) 15-16 (3-4) 16-18 (2-3)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-16 (4-2) 16-18 (3-4)	07-08 (2-1) 08-15 (1-0) 15-16 (2) 16-18 (4-3) 18-20 (4) 20-02 (3-4)
	19-20 (1-2) 18-20 (0-1)	18-20 (1-2) 20-02 (0-2) 02-07 (0-1)	18-20 (2-4) 20-02 (2-3) 02-07 (1-2)	02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-18 (4) 18-21 (2-3) 21-23 (1-2) 23-03 (1) 03-07 (0-1)	07-08 (2) 08-10 (4-2) 10-16 (4-1) 16-18 (4-2) 18-21 (3-4) 21-23 (2-3) 23-03 (1) 03-07 (1-2)	07-08 (2-1) 08-10 (2-0) 10-16 (1-0) 16-18 (2-1) 20-21 (4) 21-23 (3-4) 23-03 (3) 03-07 (2) 18-20 (4-3)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-06 (2) 06-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1) 07-08 (1-0)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

ALASKA
Openings Given In GMT#

To:	*10/15 Meters*	*20 Meters*	*40 Meters*	*80 Meters*
Eastern USA	21-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	03-10 (1) 10-12 (2) 12-13 (1)	07-12 (1)
Central USA	20-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	03-11 (1) 11-13 (2) 13-14 (1)	07-12 (1)
Western USA	20-00 (1)	17-18 (1) 18-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	04-05 (1) 05-12 (2) 12-15 (1) 15-16 (2) 16-17 (1)	05-12 (1) 12-15 (2) 15-17 (1) 12-15 (1)*

HAWAII
Openings Given in HST#

To:	*10/15 Meters*	*20 Meters*	*40 Meters*	*80 Meters*
Eastern USA	06-07 (1) 07-08 (2) 08-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1)	19-21 (1)* 21-01 (2) 01-03 (1) 23-02 (1)*
Central USA	06-07 (1) 07-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1)	19-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-05 (1) 23-03 (1)*
Western USA	12-15 (1) 06-07 (1) 07-08 (2) 08-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1)	19-20 (1) 20-22 (2) 22-04 (3) 04-05 (2) 05-07 (1) 22-05 (1)*

**Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*
***Indicates best times to listen for F-2 layer openings on 6 meters.*
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

Propagation charts prepared by George Jacobs, W3ASK.

Check out the *CQ VHF* magazine Propagation column for an in-depth look at propagation on VHF and above.

Current Solar Cycle Progress

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 76.7 for October 2005, quite a drop from September's 90.8. The 12-month smoothed 10.7-cm flux centered on April 2005 is 95.5. The predicted smoothed 10.7-cm solar flux for January 2006 is about 76, give or take about 17 points.

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for October 2005 is 8.5, a huge drop from September's 22.1, clearly indicating the end of Cycle 23. The lowest daily sunspot value during October 2005 was zero, occurring on six days: 13, 24, 25, 26, 27, 28. The highest daily sunspot count for October was 17 on the 5th. Note that the month before the highest count was 50. The 12-month running smoothed sunspot number centered on April 2005 is 31.7. A smoothed sunspot count of 14 is expected for January 2006, give or take about 12 points.

The observed monthly mean planetary *A*-index (*Ap*) for October 2005 is 7, a nice drop from September's 21. The 12-month smoothed *Ap*-index centered on April 2005 is 15.7. Expect the overall geomagnetic activity to be quiet during most days in January. At the time of this writing, the forecast holds that January will be a very quiet month with little to no geomagnetic storminess. Refer to the Last-Minute Forecast at the beginning of this column for the outlook on which days this might occur.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. See you on the air, perhaps during a contest weekend!

73, Tomas, NW7US/AAAØWA

Moderate 2005 CQ WW SSB Contest Conditions

The 2005 CQ World-Wide DX SSB Contest weekend of October 29–30 started off with great geomagnetic activity conditions. Geomagnetic activity was very quiet (with single-digit planetary *A*-index [*Ap*] readings, less than 8), making for a stable ionosphere. The day before the contest the sunspot count was zero, but then we had some activity through the contest weekend. Sunspot counts were zero on October 25, 26, 27, and 28. Then on October 29 we had a count of 11, 14 on the 30th, and 29 on the 31st. The 10.7-cm solar flux index ranged between the low 70s to just short of 80. Most of the HF contest bands were usable, although not spectacular.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2005 SSB RESULTS
SINGLE OPERATOR
QRP/p

TI5N	**A**	**1,758,266**	**14**	**522**
			(Op: N8KE)	
YT7TY	**A**	**983,135**	**924**	**515**
KA1LMR	**A**	**868,662**	**748**	**418**
UA3BL	**A**	**825,920**	**887**	**464**
OM7DX	**A**	**771,579**	**829**	**459**
TE2M	*	764,014	859	391
			(Op: TI2KAC)	
N8IE	**A**	**536,157**	**717**	**391**
VE6EX	**A**	**514,885**	**663**	**313**
RW3AI	*	399,990	624	335
OK1VBA	**A**	**319,030**	**449**	**305**
K3WW	**A**	**299,200**	**417**	**275**
VA3DF	**A**	**268,515**	**394**	**243**
UA9SG	**A**	**242,775**	**394**	**249**
RA9SC	*	232,650	360	225
ES7BL	**A**	**219,310**	**376**	**241**
			(Op: ES6PZ)	
I1BAY	**A**	**211,218**	**359**	**282**
M3RCV	**A**	**202,275**	**432**	**279**
KR1ST	**A**	**178,772**	**350**	**239**
NX9T	*	177,895	354	235
EA1TI	**A**	**177,156**	**335**	**259**
W1NT	*	176,204	310	217
LU1VK	**A**	**173,290**	**333**	**215**
ND0C	**A**	**165,648**	**312**	**232**
YO4AAC	**A**	**142,506**	**269**	**182**
WB8JUI	*	129,150	272	205
SP9RQH	**A**	**127,544**	**303**	**214**
IK5RUN	*	127,500	253	204
VE6BF	*	123,606	260	162
MM3AWD	**A**	**96,248**	**281**	**212**
RA4HW	*	95,790	294	206
LY3BY	**A**	**94,822**	**270**	**182**
YU1LM	*	92,112	263	202
OK1JDC	*	77,952	244	174
LA2MOA	**A**	**77,376**	**241**	**186**
N1TM	*	63,516	173	134
RZ9IB	*	57,546	172	139
UV1G	**A**	**54,776**	**209**	**164**
			(Op: UT7GX)	
RX6LP	*	52,096	152	114
M5AAV	*	47,090	211	170
PA3AM	**A**	**47,088**	**173**	**144**
WA8REI	*	46,728	181	132
RA9WPX	*	45,496	133	94
K4AQ	*	32,032	178	112
RX9WN	*	31,588	124	106
YO2MAX	*	28,514	135	106
DH8JAE	**A**	**27,930**	**145**	**114**
AB8DF	*	27,573	120	101
HA1CW	**A**	**24,396**	**130**	**107**
KT8K	*	22,971	107	93
N4ZAK	*	22,736	126	98
NA4BW	*	21,669	131	93
N8XA	*	21,240	108	90
RV1AT	*	18,585	120	105
AM3FF	*	18,408	89	78
			(Op: EA3FF)	
UA0S8Q	**A**	**15,844**	**94**	**68**
US0YA	*	13,524	77	69
US0YW	*	13,384	68	56
JR1WYV	**A**	**9,576**	**68**	**57**
JK1TCV	*	4,774	43	31
W2JEK	**A**	**4,242**	**45**	**42**
US8U	*	3,713	49	47
			(Op: UT5UPN)	
K9GY	*	3,071	42	37
W8VE	*	2,542	32	31
DF7LSA	*	1,104	26	24
W1CEK	*	570	17	15
UN7FZ	**A**	**420**	**14**	**14**
HB9TJW	*	144	9	9
N2YM	*	45	5	5
LU8E0T	**28**	**93,060**	**226**	**165**
W6QU	**28**	**12,772**	**74**	**62**
			(Op: W8QZA)	
YO2LYN	**28**	**6,952**	**56**	**44**
CX4AD	**28**	**2,346**	**37**	**34**
PY2MTV	**28**	**2,160**	**32**	**30**
JH3DMQ	**28**	**1,900**	**39**	**20**
SQ9DJG	**28**	**1,540**	**27**	**20**
EA1BYA	**28**	**969**	**19**	**17**
NB1B	**21**	**246,372**	**394**	**294**
RA9UAD	**21**	**145,340**	**308**	**215**
RZ6HX	**21**	**47,232**	**160**	**144**
RZ3VA	*	29,149	117	103
JR1NKN	**21**	**17,459**	**99**	**79**
WA6FGV	**21**	**15,916**	**111**	**92**
RA3XEV	*	13,286	88	73
WB7OCV	**21**	**7,482**	**59**	**58**
JI8GZS/1	*	3,060	46	36
YT2B	**21**	**2,212**	**29**	**28**
VA3JFF	**21**	**1,272**	**24**	**24**
PA1W	**21**	**792**	**24**	**22**
VK2BAA	**21**	**520**	**14**	**13**
OH8BQA	**21**	**518**	**17**	**14**
YO5KUA	**21**	**153**	**9**	**9**
			(Op: YO5OQF)	
7K1CPT	*	91	7	7
JL8HLJ	*	55	5	5
S57MSU	**14**	**347,976**	**544**	**358**
SO9L	**14**	**113,565**	**285**	**201**
			(Op: SP9UML)	
VA3VF	**14**	**55,020**	**164**	**140**
SM6CRM	**14**	**20,875**	**129**	**125**
G4KIV	**14**	**14,896**	**108**	**98**
OZ6XR	**14**	**13,870**	**114**	**95**
SP9BMH	*	8,140	86	74
HG1LPS	**14**	**3,450**	**51**	**50**
OH2BUZ	**14**	**2,835**	**47**	**45**
9A8MM	**14**	**2,668**	**52**	**46**
LA1PHA	**14**	**49**	**7**	**7**
S54AA	**7**	**2,872**	**285**	**238**
YO7MDE	**7**	**27,720**	**117**	**105**
LU8EGS	**7**	**960**	**15**	**15**
OL4W	**37**	**97,983**	**262**	**191**
			(Op: OK1IF)	
OM6TX	**3.7**	**23,958**	**122**	**99**
AM3CKX	**3.7**	**14,091**	**85**	**77**
K3BU	**1.8**	**11,115**	**103**	**65**
ES6PZ	**1.8**	**4,343**	**49**	**43**

UNITED STATES

KQ2M	**A**	**9,089,410**	**3222**	**1945**
K1LZ	**A**	**2,383,616**	**1372**	**672**
K5ZD	**A**	**1,497,156**	**951**	**537**
WA1JMP	*	1,085,596	837	508
ND1X	*	765,320	847	424
K5MA	*	487,830	533	345
W1BYH	*	485,080	518	335
NG1I	*	405,504	656	352
NY1Q	*	217,854	346	247
			(Op: N3KCJ)	
K1BV	*	214,490	345	241
KC1F	*	163,398	3	226
NN1N	*	95,858	208	167
AA1O	*	70,525	203	155
WZ1R	**14**	**3,117,244**	**1653**	**794**
			(Op: N1RR)	
***NV1N**	**A**	**2,362,512**	**1427**	**664**
			(Op: N1UR)	
***NA1QP**	**A**	**232,848**	**368**	**252**
			(Op: W1JQ)	
***KA1C**	**A**	**169,218**	**318**	**238**
*AJ1E	*	133,620	255	204
*NE1RD	*	99,882	241	179
*W1LZ	*	66,270	172	141
*KA1VMG	*	40,103	141	119
*KB1FRK	*	37,366	133	119
*AE1D	*	30,720	112	96
*N1DC	*	27,068	110	101
*W1CRK	*	19,488	99	87
*N1UZ	*	14,062	91	79
*KB1HQI	*	3,762	40	38
*K1VU	*	3,116	49	41
***KK1H**	**21**	**162,773**	**314**	**247**
***N1YKH**	**14**	**1,757**	**33**	**31**
W2GB	**A**	**1,234,944**	**925**	**536**
N2MUN	**A**	**389,980**	**512**	**310**
N2VW	**A**	**224,844**	**375**	**246**
NA2M	*	167,210	337	230
W2FUI	*	148,413	247	183
K2NV	*	128,248	251	184
W2WO	*	115,473	233	183
KD2HE	*	83,650	217	175
N2SQW	*	77,916	188	151
AK2P	*	76,638	190	159
N2USM	*	69,708	194	148
AF2K	*	41,140	143	121
KC2MDQ	*	34,888	113	89
KA2BXH	*	2,640	31	30
N2MM	**21**	**963,569**	**907**	**499**
N2GM	*	250,784	392	272
N2GC	**7**	**27,753**	**91**	**87**
W2MF	**1.8**	**39,760**	**144**	**112**
***NJ1F**	**A**	**226,512**	**384**	**242**
***KM2O**	**A**	**203,196**	**340**	**246**
***WA2MCR**	**A**	**202,320**	**324**	**240**
*N2LK	*	163,020	308	209
*K2YSY	*	132,205	261	193
*KC2GOW	*	105,789	266	197
*KV2M	*	104,144	267	184
*K2YLH	*	88,644	253	166
*KB2DE	*	80,355	210	165
*W2VU	*	67,044	178	148
*WF1L	*	63,655	205	145
*K2TV	*	56,851	160	139
*NS2P	*	56,516	168	142
*WA2RY	*	46,080	155	128
*WA2UET	*	41,125	167	125
*W2MKW	*	40,248	149	117
*WB1ERE	*	32,760	134	104
*N2MTG	*	27,918	119	94
W2RDS	*	23,460	101	92
*W2ARP	*	23,157	103	93
*WA2BKN	*	21,483	85	77
*KC2KTZ	*	14,744	83	76
*N2CK	*	13,056	74	68
*W2BVH	*	602	15	14
***WB2DVU**	**21**	**4,800**	**44**	**40**
*AB0DX	*	32	4	4
***KC2NTB**	**14**	**1,421,418**	**1130**	**614**
*K2HVE	*	24,465	115	105
*K2RED	*	3,420	40	38
KC3R	**A**	**6,758,540**	**2781**	**905**
			(Op: LZ4AX)	
K3ZO	**A**	**5,400,216**	**2243**	**828**
WE3C	**A**	**5,155,634**	**2401**	**886**
N3KS	*	2,034,815	1370	647
K3TW	*	1,420,100	1115	550
N3UM	*	1,228,596	916	516
AA3B	*	573,806	637	379
KB3TS	*	301,392	322	322
N3HS	*	180,238	290	227
4U1WB	*	132,153	328	217
			(Op: AJ3M)	
N3GNW	*	103,383	241	189
W2BZR	*	101,179	250	181
K3MRG	*	92,886	192	137
K4JLD	*	25,284	110	86
K3ISH	*	21,080	93	85
W3ELA	*	7,656	61	58
N3HBX	**14**	**3,623,628**	**1996**	**804**
W3BGN	**3.7**	**785,312**	**744**	**388**
***W3LL**	**A**	**347,510**	**505**	**310**
***W4EE**	**A**	**154,370**	**329**	**215**
*K1UZM	*	38,704	128	18
*NF3R	*	31,473	149	117
			(Op: K3ASK)	
*KA3PVA	*	24,890	114	95
*KB3MM	*	17,325	91	77
*AB3BQ	*	14,972	92	76
*AA0CY	*	3,626	39	37
*K3VED	*	3,605	39	35
*AD8J	*	3,328	37	32
*KD4MCM	*	27	3	3
WK4R	**A**	**8,883,951**	**3627**	**1059**
K4ZW	**A**	**7,107,828**	**2841**	**897**
AD4TR	**A**	**1,904,448**	**1517**	**654**
KR4M	*	774,936	713	423
NJ2F	*	541,782	658	381
W4NZ	*	514,624	593	344
WB2OLP	*	435,500	590	335
NX4DG	*	416,876	568	356
W4NTI	*	350,497	499	311
W2OO	*	349,800	436	275
W4YE	*	300,849	425	289
N4UH	*	144,557	259	193
W7QF	*	139,944	256	204
K1ZW	*	135,824	275	208
N4DWK	*	78,842	182	158
KE6QR	*	75,998	259	158
N4JOB	*	73,095	209	165
NC4MI	*	61,994	174	139
K8XS	*	46,256	141	112
WD2E	*	31,140	99	90
K4ADR	*	29,224	117	104
N4ABC	*	28,224	123	112
NF4A	*	27,727	150	119
N0KTY	*	25,186	98	98
KB0OP	*	22,800	107	95
W4HJ	*	22,250	96	89
AC4CS	*	21,168	136	98
K4SV	*	20,833	98	83
K8YC	*	8,178	62	58
N4MM	*	833	17	17
WN1GIV	**28**	**166,050**	**389**	**225**
			(Op: N4BP)	
K4OH	**14**	**11,480**	**75**	**70**
W4ATL	*	11,096	91	76
NK4CC	*	3,772	47	41
			(Op: K4CC)	
WW4LL	**7**	**28,000**	**88**	**80**
KG4NEP	**3.7**	**485,688**	**696**	**354**
AA4MM	**3.7**	**159,885**	**303**	**209**
***NK4A**	**A**	**3,587,572**	**2046**	**796**
			(Op: N4PN)	
***N4NX**	**A**	**586,254**	**636**	**398**
***KA8Q/4**	**A**	**580,038**	**662**	**349**
*KI3O	*	528,882	605	362
*WB2RHM	*	427,652	551	331
*KB1ILN	*	375,906	475	282
*K4JAF	*	318,780	461	308
*KD4MCA	*	301,476	472	291
*AA4RX	*	298,242	375	263
*W4KAZ	*	290,790	419	270
*N4JED	*	246,206	425	257
*AA4FU	*	185,948	364	229
*W4CEO	*	184,977	325	221
*W4DAN	*	162,840	344	236
*K4WES	*	159,960	285	215
*KT4PD	*	147,798	319	207
*KA0GGI	*	137,385	350	215
*VE3XD/W4	*	131,580	293	204
*W4RQ	*	130,800	256	200
*K4DET	*	126,524	276	188
*N2IXX	*	123,808	289	212
*KN1DX	*	119,560	280	196
				(Op: K1SE)
*WD4LBR	*	114,835	255	193
*W4XO	*	101,851	276	179
*WA4OSD	*	99,544	269	184
*W4TTX	*	93,080	243	179
*N4HXI	*	86,000	251	172
*W4TDB	*	73,710	201	162
*K4NKY	*	72,450	226	150
*N4ESS	*	66,861	209	153
*KI4ACW	*	65,404	230	166
*K4RFK	*	57,820	179	140
*KI4EXW	*	56,420	162	130
*N3UA	*	53,820	145	115
*KA4AXS	*	41,097	176	133
*W8EHH	*	36,848	175	112
*K4IE	*	34,870	124	110
*W4WNT	*	34,410	142	111
*WA4BKW	*	33,745	200	150
*KG4OJT	*	31,080	137	105
*K4PPK	*	29,892	130	106
*WN4DX	*	26,877	106	93
*KG4MWO	*	26,602	114	94
*WA3OFC	*	23,970	98	85
*K4FTO	*	23,276	128	92
*K4AH	*	19,635	101	85
*KD6AKC	*	17,347	96	83
*AE4EC	*	17,347	93	83
*K3MZ	*	17,017	90	77
*WW2DDM	*	15,150	90	75
				(Op: K4UK)
*KU4UV	*	15,120	105	84
*K4LW	*	12,921	78	73
*KB8UFP	*	9,796	66	62
*W4PI	*	7,668	56	54
*K2EKM	*	5,734	52	47
*AG4ZM	*	1,624	33	29
*AD4AX	*	1,590	31	30
*K4DXU	*	1,449	26	23
*W4OGG	*	1,400	30	25
*KU4YW	*	1,008	25	21
*K5VG	*	900	19	18
*N9XY	*	738	18	18
*KV4DJ	*	561	19	17
*K4KUZ	*	70	5	5
				(Op: W4UM)
*W4/AB8PV	*	12	2	2
***NA4W**	**28**	**138,000**	**324**	**200**
				(Op: K4WI)
***K9OM**	**28**	**29,205**	**123**	**99**
*W4JIK	*	7,546	54	49
*KI4VB	*	731	17	17
***WA4FXX**	**21**	**12,816**	**75**	**72**
*NO4K	*	5,472	53	48
***N4MO**	**14**	**400,680**	**455**	**360**
***KZ5OH**	**14**	**151,305**	**281**	**231**
*W9IGJ	*	81,796	193	169
*KI4JBD	*	128	8	8
*VE3NLP/W4	*	45	5	5
***K4AF**	**7**	**12,240**	**54**	**51**
				(Op: K9GY)
K5TR	**A**	**4,645,318**	**3102**	**862**
N2IC	**A**	**4,610,205**	**2813**	**795**
W5WMU	**A**	**3,448,956**	**2297**	**798**
KI5DR	*	3,105,008	2315	752
W5PF	*	198,374	324	254
KU5S	*	102,249	258	189
N5DD	*	96,025	206	167
N6ZZ	*	69,560	198	148
K5SF	*	34,270	143	115
KC5DJI	*	13,345	99	85
KD5VID	*	9,858	71	62
KE5BUD	*	1,248	26	24
N5PU	*	372	12	12
KJ5Y	**28**	**466,264**	**787**	**349**
				(Op: W5PR)
NO5K	**21**	**672,035**	**897**	**455**
				(Op: W5ASP)
***WD5K**	**A**	**1,522,092**	**1306**	**572**
***N5DO**	**A**	**926,287**	**950**	**449**
***W9DX**	**A**	**506,484**	**656**	**396**
*W5GAI	*	328,302	446	299
*KE5LQ	*	289,742	468	277
*WD5KCX	*	110,370	268	195
*W5GZ	*	102,600	268	180
*WA5OIK	*	85,575	257	175
*WB5IZD	*	79,975	245	175
*WB5TUF	*	68,160	206	142
*KE5OG	*	66,248	293	169
*K5WWT	*	65,268	210	147
*NX5N	*	58,144	224	158
*KC5TA	*	55,692	183	156
*KK5MI	*	29,493	138	113
*KD5OWO	*	23,861	135	107
*AB5XZ	*	19,872	114	96
*K7RB	*	19,488	128	87
*WM5R	*	12,900	91	75
*AD5LU	*	8,768	85	64
*KB5KNF	*	6,900	52	46
*NE0P	*	2,835	37	35
*AD5SR	*	1,274	29	26
*N6MAW	*	21	3	3
***KD5TXL**	**28**	**6,721**	**54**	**47**
WX4G	**A**	**1,047,573**	**1022**	**479**
WT6TT	**A**	**882,657**	**1079**	**459**
				(Op: N6NZ)
K6QK	**A**	**738,195**	**1100**	**435**
AK6DV	*	383,376	674	326
KJ6RA	*	371,904	482	312
W6TK	*	245,488	526	268
K6LRN	*	219,360	408	240
KO6LU	*	147,352	369	226
AD6KA	*	120,139	304	191
WW6O	*	109,494	280	198
NF6V	*	79,514	229	166
KY6LA	*	74,850	213	150

NO6X	*	51,072	179	128
KX6SUB	*	43,624	172	133
			(Op: K6III)	
NR3Y	*	35,306	162	127
WB6JJJ	*	34,500	125	92
WA6PY	*	14,520	78	60
W6XU	*	12,864	80	67
AE6RR	*	9,394	82	61
NA6Q	*	6,110	55	47
			(Op: W6SJ)	
WA6NOL	*	3,605	37	35
W6AFA	**21**	**201,196**	**396**	**266**
N6QQ	*	87,096	251	191
K6HNZ	**14**	**583,528**	**900**	**418**
***WN6K**	**A**	**329,130**	**615**	**318**
***K5XV**	**A**	**191,172**	**388**	**257**
***N6NF**	**A**	**146,050**	**457**	**230**
*N6EM	*	126,336	323	192
*KG6TT	*	92,901	274	173
			(Op: KG6TT)	
*WB6NFO	*	84,870	216	205
*N6WK	*	59,796	174	132
*KV6O	*	51,054	193	134
*AA6K	*	44,988	157	138
*NF6A	*	31,700	120	100
		(Op: K6XX@K6XX)		
*W6FRH	*	31,413	158	111
*W6RJQ	*	28,808	118	104
*K2RD	*	23,436	107	84
*KG6NDO	*	20,384	121	91
*N6RZR	*	18,146	109	86
*K6CSL	*	11,712	82	64
*AA6EE	*	11,008	77	64
*K6BIR	*	9,324	78	63
*K1USC	*	1,431	28	27
*WB6NL	*	690	24	23
***KM6Z**	**28**	**9,990**	**66**	**54**
***NP4IW/AB6**	**21**	**55,583**	**232**	**163**
*W6KNB	*	1,248	25	24
***N6QZS**	**14**	**1,450**	**31**	**29**
***KU6T**	**7**	**17,136**	**79**	**72**
*WA6WPG	*	12,760	57	55
KW7Y	**A**	**5,751,270**	**2814**	**945**
			(Op: K7RL)	
NK7U	**A**	**2,995,906**	**2071**	**739**
			(Op: N6MJ)	
KN7NV	**A**	**2,721,482**	**1989**	**662**
			(Op: KL2A)	
N7TT	*	1,836,588	1791	579
WA7LT	*	1,415,646	1440	558
NI7T	*	976,419	942	477
W7EB	*	967,904	1410	464
KD7X	*	863,498	1088	466
KE7RT	*	308,270	552	290
KØJJ	*	293,879	486	293
KE7XE	*	177,786	368	238
NJ7I	*	125,370	289	210
NN7ZZ	*	123,654	336	222
			(Op: N5LZ)	
K7LV	*	115,290	268	183
W7MGC	*	113,664	271	192
N7BF	*	69,394	231	157
NF7E	*	67,353	249	157
K7WM	*	40,467	156	123
KC7UP	*	39,412	141	118
KS7T	*	30,192	130	111
KG7P	*	27,440	156	112
K7VI	*	24,300	123	100
KF7IQ	*	22,792	119	88
WG7Y	*	11,826	112	81
W7LKG	*	11,786	75	71
K7MY	*	9,943	72	61
W7WA	**14**	**3,797,420**	**2212**	**902**
WA7AR	*	272,350	519	325
			(Op: W7FP)	
W7QN	*	92,000	246	200
KD7KZN	*	77	7	7
W7AYY	**7**	**5,934**	**48**	**46**
***NT4TT**	**A**	**1,057,920**	**979**	**551**
***N7VR**	**A**	**241,660**	**466**	**281**
***K6TIM**	**A**	**240,159**	**403**	**277**
*N7ZG	*	177,225	363	255
*AE7DX	*	161,092	397	206
*AA7PM	*	157,182	298	201
*WK7P	*	82,320	266	168
*K7PRW	*	62,155	225	155
*NQ7R	*	61,116	210	132
*KG9JP	*	60,300	224	150
*AK7AT	*	52,745	215	137
*N7VS	*	46,540	194	130
*W7YVK	*	38,446	124	94
*K7NWS	*	36,084	149	124
			(Op: W7VXS)	
*KG7WZ	*	22,927	135	101
*KQ7W	*	18,200	131	100
*KQ6MU	*	18,124	132	92
*N7IZ	*	16,102	105	83
*N7XY	*	15,747	107	87
*W7YS	*	13,203	98	81
*K7ACZ	*	11,310	71	58
*KD6MZY	*	8,723	72	61
*K7TR	*	8,400	56	50
*KA7RRA	*	7,502	77	62
*WY7LL	*	3,456	55	48
*KD7EJC	*	1,309	22	17
***K8IA**	**21**	**231,660**	**506**	**286**
*W7UPF	*	90,356	231	196
***N6TPT**	**14**	**588**	**23**	**21**
*KD7YCU	*	126	9	9
***K7AWB**	**7**	**7,020**	**54**	**54**
W8MJ	**A**	**2,235,806**	**1909**	**646**
K2UOP	**A**	**597,919**	**642**	**373**
K8GL	**A**	**387,195**	**497**	**311**
KQ8J	*	241,572	402	246
			(Op: K8BB)	
K8VUS	*	140,967	276	207
KC8IVC	*	15,090	140	133
K8GVK	**7**	**39,795**	**111**	**105**
K8OQL	**1.8**	**2,010**	**46**	**30**
***WB8TLI**	**A**	**920,125**	**795**	**433**
***WA8WV**	**A**	**595,315**	**627**	**365**
***AK8B**	**A**	**271,397**	**437**	**283**
*KN8J	*	162,855	337	231
*KB8UUZ	*	113,778	274	189
*WF5X	*	77,328	252	179
*K8GT	*	58,179	160	129
*KB8VZY	*	56,414	176	134
*KD8ACG	*	37,920	148	120
*N8XD	*	33,912	129	108
*KB8QO	*	15,300	83	75
*KC8YSW	*	2,686	36	34
*KC8IUM/M	*	546	17	14
*W8KNO	*	532	14	14
***N8OL**	**21**	**87,242**	**210**	**181**
***NV8N**	**14**	**424,258**	**604**	**401**
*N8ILU	*	86,955	223	187
*AF8C	*	32,148	133	114
AB9H	**A**	**1,664,390**	**1400**	**590**
K9JIG	**A**	**171,522**	**335**	**234**
K9TR	*	138,020	279	206
K9FH	*	1	1	1
K9UQN	**14**	**81,524**	**213**	**178**
N9GY	*	4,796	46	44
			(Op: KC9GRO)	
KK9V	**3.7**	**44,800**	**183**	**140**
***K9QVB**	**A**	**622,710**	**735**	**407**
***WW9R**	**A**	**537,801**	**746**	**379**
***K9JE**	**A**	**231,540**	**388**	**255**
*N9TTX	*	165,244	331	218
*K1TN	*	141,984	293	204
*W9RE	*	101,493	197	189
*W9LYA	*	90,072	252	162
*WM9M	*	68,250	245	150
*N9LYE	*	63,900	207	142
*KD4ULW	*	52,264	168	139
*K9FOH	*	49,923	175	129
			(Op: K9FOH)	
*W9VQ	*	44,772	136	123
			(Op: W9VQ)	
*KZ9O	*	38,040	156	120
*K9XL	*	24,992	105	88
			(Op: K9XL)	
*K8ZZV	*	15,189	100	83
*KB9WBM	*	12,835	85	85
*K9QH	*	5,856	54	48
*KA9VHG	*	4,950	51	45
*W9WY	*	4,888	56	52
*KF9SQ	*	3,388	52	44
*K9ZEN	*	1,885	33	29
*NØICV	*	1,062	21	18
*KA9OBZ	*	308	11	11
***W9ILY/M**	**21**	**704**	**18**	**16**
***WD9OJD**	**14**	**53,630**	**184**	**155**
*N9GBB	*	468	18	18
***W9LYN**	**3.7**	**17,512**	**105**	**88**
KU1CW	**A**	**2,834,100**	**1862**	**705**
KTØR	**A**	**997,340**	**1221**	**470**
KOØU	**A**	**982,768**	**1063**	**478**
KØGAS	*	358,385	540	313
WBØN	*	214,361	347	271
NN7L	*	205,485	549	285
KØBUD	*	158,327	298	247
KØDAT	*	105,896	237	217
WØPPF	*	100,926	267	189
KØDENE	*	87,135	225	157
NØUU	*	62,034	164	147
KØCOM	*	49,920	166	120
WAØMHJ	*	28,224	98	98
WØTT	*	3,124	47	44
N6BXO	*	2,146	29	29
KØRI	**28**	**35,175**	**137**	**105**
KØRH	**21**	**332,846**	**506**	**326**
WØCEM	**14**	**7,897**	**53**	**53**
***ACØW**	**A**	**1,579,706**	**1508**	**566**
***NTØF**	**A**	**426,990**	**556**	**331**
***NØBUI**	**A**	**155,724**	**344**	**228**
*AAØNK	*	121,667	293	191
*WBØYJT	*	64,200	189	150
*KAØZPP	*	63,921	185	149
*KBØNHW	*	58,350	210	150
*KBØARZ	*	57,681	199	153
*NØCQI	*	40,382	153	122
*WØQQS	*	35,046	153	118
*NØKM	*	32,700	143	109
*WVØH	*	24,786	127	102
*KAØZIA	*	21,203	107	91
*KB8CL	*	16,704	105	87
*WBØTRA	*	16,456	112	88
*N8XTZ	*	6,032	61	52
*KAØEIC	*	5,145	52	49
*NA3J	*	4,002	57	46
*KAØLDG	*	2,528	33	32
*WBØUZM	*	128	10	8
***NØUNL**	**21**	**8,344**	**62**	**56**
			(Op: WDØBGZ)	
***WA5SWN**	**14**	**8,944**	**78**	**68**
*KØJV	*	828	18	18

NORTH AMERICA

BARBADOS

8P9AM	**A**	**18,516,316**	**5392**	**1183**
			(Op: MØSDX)	
***8P2K**	**A**	**1,220,590**	**1130**	**479**
			(Op: 8P6SH)	
*8P6ET	*	78,720	202	160

CUBA

***CO6LPB**	**7**	**83,369**	**149**	**121**

MARTINIQUE

FM5FJ	**14**	**1,554,000**	**1149**	**560**
***FM/F5TGR**	**A**	**14,504**	**79**	**74**

DOMINICAN REPUBLIC

***HI8ROX**	**A**	**312,816**	**506**	**266**

PANAMA

HP3BS	**A**	**1,365,210**	**1388**	**462**

HONDURAS

***HQ2DMR**	**A**	**573,183**	**702**	**351**
*HR2AHC	*	125,800	259	185

GUANTANAMO BAY

KG4GJ	**A**	**42,036**	**155**	**113**
KG4WW	**21**	**3,108,072**	**2036**	**671**

ALASKA

AL9A	**A**	**641,004**	**663**	**364**
AL1G	*	416,976	559	272
***KL1SF**	**A**	**28,992**	**109**	**96**
*KL8DX	*	17,862	92	78
*AL2F	*	960	21	20

US VIRGIN ISLANDS

WP2Z	**A**	**9,609,516**	**4020**	**1026**
			(Op: K8MJZ)	
NP2I	**A**	**3,501,386**	**2149**	**653**

PUERTO RICO

KP4JRS	**A**	**238,355**	**393**	**247**
KP4WW	**21**	**4,934,388**	**2437**	**849**
***WP3GW**	**A**	**69,840**	**176**	**144**
***WP3C**	**21**	**2,261,376**	**1606**	**624**
***NP3FY**	**28**	**257,176**	**480**	**244**

GREENLAND

***OX3RZ**	**14**	**61,680**	**172**	**120**

GUADELOUPE

***TG9ANF**	**14**	**561,660**	**759**	**345**

COSTA RICA

TI4CF	**7**	**8,057,479**	**1953**	**751**
			(Op: TI2CF)	
***TI2VW**	**21**	**1,348,620**	**1220**	**507**

ANTIGUA

***V25O**	**A**	**7,051,968**	**2992**	**864**
(Op: LY2CY)				

BELIZE

V31LZ	**28**	**779,943**	**978**	**373**
			(Op: LZ1MS)	

CANADA

VC3A	**A**	**11,545,368**	**3681**	**1039**
			(Op: VE3AT)	
VE3DZ	*	8,291,058	2783	967
VO1AU	**A**	**8,056,636**	**2678**	**854**
VO1MP	*	4,636,116	1917	698
VE3CR	*	1,710,786	1058	539
VE3XN	*	1,004,562	802	486
VA3NR	*	311,520	419	240
VE2QIP	**A**	**192,698**	**271**	**209**
VE9MY	**A**	**142,048**	**239**	**193**
VY1CQ	**A**	**103,179**	**247**	**163**
VE6FN	**A**	**37,336**	**131**	**104**
VA5SAM	**A**	**8,085**	**50**	**49**
VE6WQ	**14**	**3,117,516**	**1872**	**717**
VE6RST	*	2,690,680	1706	685
VE7AV	**14**	**1,567,503**	**1260**	**537**
VE7KET	*	103,096	211	196
VA7RR	**7**	**1,912,106**	**992**	**427**
VA6MA	**7**	**233,025**	**286**	**195**
VE7SZ	**3.7**	**427,044**	**458**	**228**
VA3QP	**3.7**	**360,714**	**386**	**237**
VA3XH	*	18,850	69	65
VE3LKA	**1.8**	**960**	**18**	**15**
			(Op: LU7DW/VE2DWA)	
***VE3JAQ**	**A**	**653,527**	**590**	**367**
***VE1DHD**	**A**	**504,387**	**564**	**351**
***VO2ZT**	**A**	**446,682**	**495**	**327**
*VA3SWG	*	401,495	470	295
*VE3XAT	*	364,728	423	312
*VE3KP	*	343,175	415	265
***VE7XF**	**A**	**313,720**	**342**	**341**
*VE3RCN	*	258,516	359	258
*VE3VMP	*	239,514	379	209
*VE1YDX	*	233,864	318	248
			(Op: VE1JS)	
*VE3WG	*	225,774	326	222
***VE4YU**	**A**	**219,010**	**351**	**242**
*VA1CHP	*	191,520	293	224
*VA7LC	*	182,750	317	215
***VE9NC**	**A**	**168,861**	**256**	**231**
*VA3JNO	*	141,120	253	192
*VE2AWR	*	138,885	253	197
***VE5SF**	**A**	**132,745**	**275**	**191**
*VA3GD	*	110,028	236	173
*VA3OX	*	102,762	207	173
*VE7NS	*	84,231	203	147
*VE7BSM	*	81,305	204	161
*VE3NK	*	47,502	145	117
*VA2UK	*	37,855	135	113
*VA7MJR	*	23,594	110	94
***VO1MX**	**A**	**23,177**	**85**	**77**
*VE4VID	A	276	12	12
***VA3FP**	**21**	**72,228**	**176**	**156**
***VE7IN**	**21**	**69,768**	**204**	**153**
*VE7WWW	*	4,284	48	42
***VE7ON**	**14**	**531,828**	**622**	**374**
***VE1OP**	**14**	**183,138**	**366**	**233**
***VE3FH**	**14**	**150,080**	**269**	**224**
***VE6TN**	**14**	**107,282**	**253**	**194**
***VE3MGY**	**1.8**	**170,754**	**311**	**149**

TURKS AND CAICOS

***VQ5L**	**A**	**5,411,050**	**2729**	**775**
			(Op: LA9HW)	

MEXICO

XE2K	**A**	**4,655,550**	**2050**	**615**
XE1MM	*	749,322	761	399
***XE2AUB**	**A**	**669,750**	**776**	**375**
*XE1CQ	*	180,642	351	231
*XE2MX	*	48,895	159	127
***XE1GRR**	**21**	**763,685**	**858**	**403**

CAYMAN ISLANDS

ZF1A	**21**	**3,324,268**	**2073**	**694**
			(Op: W6VNR)	

AFRICA

MADAGASCAR

5R8FU	**A**	**187,056**	**293**	**216**

NIGER

5U7JB	**A**	**6,679,253**	**2501**	**829**
5U7B	*	299,841	359	267

SENEGAL

***6W7RV**	**21**	**1,083**	**19**	**19**

GHANA

***9G5ZS**	**14**	**12,805**	**67**	**65**

MOROCCO

CN2US	**A**	**10,672**	**61**	**58**
			(Op: KE1AT)	
CN2R	**7**	**14,724,696**	**2652**	**931**
***CN2BC**	**A**	**3,414,810**	**1620**	**690**

MADEIRA ISLANDS

CT3KN	**14**	**2,101,005**	**1197**	**591**
CT9M	**1.8**	**148,577**	**176**	**143**
			(Op: CT3KY)	
CT3KU	*	432	9	8

CAPE VERDE

D4B	**A**	**26,871,482**	**6245**	**1271**
			(Op: 4L5A)	

CANARY ISLANDS

EA8TX	**A**	**362,664**	**413**	**292**
AN8AD	*	65,390	169	130
ED8CAC	**21**	**5,253,402**	**2145**	**822**
			(Op: EA8CAC)	
EA8EW	**14**	**8,719,848**	**2988**	**978**
			(Op: ES2RR)	
AN8AH	**7**	**7,129,487**	**1682**	**709**
			(Op: OH1RY)	
***ED8BTM**	**A**	**1,309,872**	**831**	**464**
			(Op: EA8BTM)	
*EA8/DJ1OJ	*	103,785	200	165
*EF8ABT	*	60,388	156	124
***AM8AKN**	**28**	**75,485**	**169**	**155**
***EC8ADU**	**21**	**1,250,480**	**958**	**440**
***EA8BSR**	**14**	**82,385**	**179**	**155**
*EA8ARG	*	41,876	123	116

SUDAN

ST2NH	**A**	**223,740**	**230**	**165**
***ST2T**	**21**	**4,594,725**	**2281**	**675**
			(Op: S57CQ)	

MALI

TZ9A	**A**	**3,891,540**	**1504**	**790**

CHAGOS IS.

VQ9LA	**A**	**3,644,928**	**1773**	**678**

ASCENSCION IS.

ZD8Z	**21**	**17,129,112**	**4804**	**1196**
			(Op: N6TJ)	

SOUTH AFRICA

ZS75PTA	**A**	**193,131**	**311**	**207**
			(Op: ZS6KR)	
***ZS6RAE**	**A**	**19,908**	**90**	**79**
*ZS4BS	*	432	12	12
***ZS9Z**	**21**	**353,640**	**431**	**280**

ASIA

AZERBAIJAN

4J7WMF	**A**	**544,209**	**536**	**283**

GEORGIA

4L8A	**14**	**6,279,069**	**2501**	**901**
***4L2M**	**A**	**2,277,573**	**1349**	**557**

ISRAEL

***4XØL**	**A**	**993,600**	**826**	**432**
			(Op: 4Z4TL)	
*4Z5MY	*	29,988	104	102
***4XØT**	**3.7**	**51,210**	**99**	**90**
			(Op: 4Z5FI)	

CYPRUS

5B/MØXAA	**28**	**748,500**	**878**	**375**

WEST MALAYSIA

9M2MT	**A**	**357,594**	**494**	**321**

SINGAPORE

9V1UV	**A**	**59,472**	**220**	**144**
9V1RH	*	51,620	165	116

TAIWAN

***BU2AI**	**A**	**31,501**	**141**	**109**
***BX3AC**	**21**	**1,095,468**	**1140**	**473**
*BV2WS	*	160	10	10

CHINA

***BG6AHP**	**A**	**10,010**	**80**	**65**
***BG7LVL**	**28**	**1,984**	**32**	**31**

ARMENIA

***EK3SA**	**21**	**1,277,696**	**1048**	**434**

KYRGYZSTAN

EX2M	**A**	**1,503,810**	**1113**	**490**
***EX2X**	**A**	**2,181,292**	**1426**	**587**
*EX8AA	A	40,320	96	80
***EX7ML**	**21**	**555,222**	**613**	**366**

TAJIKISTAN

EY3M	**A**	**516,915**	**615**	**315**
			(Op: EY8WW)	

TURKMENISTAN

***EZ8CW**	**3.7**	**12,015**	**46**	**45**

SOUTH KOREA

HL5UOG	**A**	**84,870**	**222**	**138**
***DS5KJR**	**A**	**10,244**	**76**	**52**
***HL9TY**	**14**	**33,579**	**159**	**117**

THAILAND

***E21EIC**	**A**	**2,872,637**	**1509**	**591**
*HS1OVH	*	9,804	66	57
*E20YLM	*	1,475	25	25
***E20WXA**	**7**	**1,978**	**30**	**23**
***HS8KGG**	**14**	**1,200**	**22**	**20**

SAUDI ARABIA

***HZ1EX**	**A**	**360,573**	**463**	**263**
***7Z1SJ**	**21**	**714,896**	**700**	**364**

JAPAN

JS3CTQ	**A**	**3,631,565**	**2016**	**665**
JA2BNN	**A**	**561,099**	**614**	**347**
JO7KMB	**A**	**334,560**	**453**	**272**
JM4WUZ	*	48,960	156	120
7J1ABD	*	10,260	74	57
JG2REJ	*	4,480	40	40
JR1BAS	*	1,586	27	26
JR3NDM	*	198	9	9
JA6BGA	**28**	**43,818**	**170**	**109**
JI1FDF	**14**	**169,043**	**307**	**217**
***JRØETA**	**A**	**283,824**	**436**	**243**
***JA1KK**	**A**	**104,720**	**232**	**154**
***7J1BAR**	**A**	**62,480**	**191**	**142**
*JA4BAA	*	39,832	145	104
*JJ1MZH	*	36,248	126	92
*JR1MRG	*	34,040	137	92
*JA5EO	*	27,057	126	95
*JQ1AHZ/6	*	21,983	111	89
*JL3RDC	*	17,936	92	76
*JJØAEB	*	13,440	78	70
*JR2SQU	*	3,536	47	34
*JR1UMO	*	150	5	5
***7N2UQC**	**28**	**13,266**	**94**	**67**
*JA1AAT	*	3,663	45	37
***JR3RIY**	**21**	**351,480**	**476**	**290**
***JP1JIP/7**	**21**	**86,790**	**230**	**165**
*JR4GPA	*	48,314	162	119
*JA3PYH	*	30,805	123	101
*JI7WPV	*	20,210	101	86
*JI8BUR/8	*	16,827	87	79
*JA1DBG	*	7,050	55	50
*JR3KAH	*	5,490	52	45
*JO3CQF	*	2,937	33	33
*JG1GCO	*	280	10	10
*7K1EQG	*	264	12	12
*JQ2EAN	*	72	6	6
*JI2LFX	*	8	2	2
*JH3BNB	*	1	1	1
***JHØEPI**	**14**	**27,423**	**107**	**99**
*JE1GZB	*	15,760	82	80
***JM2FCJ/9**	**7**	**768**	**12**	**12**

MONGOLIA

JT1CO	**A**	**2,149,120**	**1669**	**584**

TURKEY (ASIATIC)

***TA2IB**	**21**	**247,324**	**382**	**242**
***YMØT**	**1.8**	**486,846**	**383**	**222**
			(Op: TA2RC)	

ASIATIC RUSSIA

RK9CWW	**A**	**6,197,370**	**2563**	**835**
UA9JDP	**A**	**4,125,510**	**1962**	**690**
UA9CMQ	**A**	**2,007,490**	**1248**	**547**
UA9KJ	*	1,617,567	1182	483
RN9RZ	*	945,145	726	421
RA9ST	*	662,388	668	382
UA9FM	*	584,752	611	368
RX9JP	*	563,332	636	341
UA9UDC	*	189,317	294	197
RK9UC	*	141,316	238	196
UA9CIR	*	109,221	169	147
RU9WX	*	102,172	213	178
RX9JD	*	84,624	192	164
UA9YAD	*	48,875	141	125
RV9JE	*	29,432	119	104
RA9HTO	*	2,752	36	32
RW9TA	**21**	**583,975**	**623**	**355**
UA9KM	**7**	**69,805**	**173**	**115**
RX9UKF	**3.7**	**77,056**	**135**	**112**
***UA4LCQ/9**	**A**	**2,261,340**	**1367**	**612**
***UA9AL**	**A**	**1,615,221**	**1067**	**459**
***UA9ACJ**	**A**	**1,183,184**	**818**	**384**
*UA9WQK	*	1,140,090	832	427
*RX9AM	*	1,042,899	788	429
*UA9XF	*	941,660	723	394
*RK9CR	*	908,208	781	371
*RV9UP	*	774,060	784	380
*RK9XX	*	594,660	591	340
*RV9CM	*	577,296	582	342
*RZ9OW	*	563,922	639	354
*UA9FGJ	*	500,136	495	312
*RK9DR	*	475,200	507	300
*RV9AZ	*	474,320	487	308
*UA9AX	*	410,661	457	309
*RX9FR	*	383,679	464	267
*UA9MQR	*	329,498	459	247
*RW9DW	*	303,912	407	252
*RA9DZ	*	237,900	383	260
*UA9OMT	*	196,881	349	219
*RX9DJ	*	154,014	280	193
*UA9XL	*	113,142	229	173
*UA9LCY	*	87,164	204	154
*RA9XF	*	40,260	142	110
*RA9QBR	*	34,668	134	108
*RU9WB	*	32,946	128	114
*RV9CQ	*	26,790	108	95
*RK9KWI	*	11,115	75	57
*UA9OA	*	243	11	9
***UA9MAZ**	**28**	**172,769**	**315**	**197**
*RW9RA	*	41,820	150	123
***RZ9AD**	**21**	**600,060**	**630**	**365**
***RA9FEL**	**21**	**453,296**	**522**	**328**
*RW9QA	*	287,000	398	287
*UA9QA	*	246,957	360	263
*RA9UN	*	148,088	284	214
*UA9OS	*	117,656	238	191
*RV9WB	*	4,095	43	39
***UA9LAU**	**14**	**1,250,928**	**894**	**511**
***RA9AU**	**14**	**983,255**	**767**	**455**
*RA9JM	*	293,475	401	273
*RA9XU	*	170,023	285	227
*UA9TO	*	38,150	126	109
*RV9CLF	*	29,694	108	101
*UA9LGL	*	4,680	41	40
*RX9FW	*	1,944	28	27
***UA9CL**	**3.7**	**75,570**	**125**	**110**
RWØAR	**A**	**444**	**14**	**12**
RAØAA	**21**	**9,660**	**90**	**69**
RKØUT	**14**	**158,952**	**318**	**222**
UAØAZ	*	14,580	90	54
RZØSR	**7**	**283,290**	**372**	**210**
***RUØAJD**	**A**	**317,254**	**501**	**238**
***UAØAPV**	**A**	**162,120**	**255**	**210**
*RAØAY	*	82,050	197	150
*UAØSOU	*	325	15	13
***UAØSAD**	**28**	**61,275**	**231**	**129**
***RAØAKL**	**14**	**10,416**	**64**	**62**
***UAØFDX**	**7**	**104,199**	**275**	**141**

KAZAKHSTAN

UN7MMM	**A**	**1,718,147**	**1029**	**461**
UN2E	**A**	**1,430,675**	**911**	**445**
UN5J	**28**	**109,120**	**254**	**155**
***UN7FW**	**A**	**517,962**	**587**	**346**
***UN7PBY**	**A**	**448,440**	**543**	**303**
*UN8FR	*	438,360	559	312
*UN7QF	*	61,608	177	136
*UN2O	*	232	19	8
***UN6LN**	**14**	**684,804**	**644**	**383**
***UN7EX**	**28**	**14,820**	**85**	**76**

HONG KONG

VR2XMT	**A**	**1,585,216**	**1634**	**527**
VR2BG	**21**	**328,848**	**626**	**312**
***VR2XLN**	**A**	**900,618**	**1189**	**409**
*VR2XLL	*	2,730	42	35

INDIA

*AT8D	A	171,186	369	206
			(Op: VU3DJQ)	

LAOS

*XW3DT	28	684,394	792	358

MACAU

*XX9AU	21	8,448	86	66

IRAQ

*YI9QWO	A	1,190,882	1001	418
*YI9VCQ	A	1,190,280	1068	390

UK BASES ON CYPRUS

ZC4LI	21	1,572,480	1280	455

EUROPE

CROATIA

9A4KW	A	538,811	658	403
9A7DM	7	1,007,068	933	446
9A5Y	3.7	2,088,889	1300	583
			(Op: 9A3LG)	
9A5E	3.7	2,018,250	1300	575
*9A3QB	A	353,710	483	310
*9A6AJK	A	111,930	303	205
*9A5BB	"	89,466	235	186
*9A3KS	"	70,470	199	162
*9A2GA	"	58,950	195	150
*9A5YY	"	26,814	130	109
*9A1CMS	"	14,288	92	76
			(Op: 9A6KZH)	
*9A1DL	"	4,900	54	50
*9A4RV	21	285,312	338	256
*9A2TE	"	155,806	296	217
*9A7R	14	112	8	8
*9A3RE	1.8	87,548	249	172

MALTA

*9H3MR	A	241,108	510	316
			(Op: IK1PMR)	
*9H3LEO	"	17,108	134	94
			(Op: K2LEO)	

PORTUGAL

CT1FFU	A	126,252	257	189
CT8T	14	6,703,695	3411	1035
*CT7B	A	6,135,116	2610	929
			(Op: CT1ILT)	
*CT1FMS	A	150,598	278	217
*CQ7IUB	"	82,080	231	190
*CT1GVN	"	8,094	59	57
*CT4GO	"	2,378	30	29
*CT1AGS	14	285	15	15
*CT2IQK	3.7	28,684	119	101

GERMANY

DL6FBL	A	9,750,351	3418	1073
DF3KV	A	1,895,234	1261	622
DK2OY	A	1,112,133	986	503
DL9NDS	"	948,420	813	495
DHØGHU	"	925,380	902	485
DL9DYL	"	542,090	590	359
DLØAZ	"	435,344	549	368
			(Op: DHØGDS)	
DL8OBF	"	416,740	568	335
DL1PT	"	200,984	383	259
DL6RBH	"	167,778	337	234
DL3EBX	"	156,600	302	232
DL9ZWG	"	152,656	317	232
DL1BA	"	113,424	256	204
DF2LH	"	107,060	240	202
DL5SDK	"	102,834	248	197
DG4DB	"	82,838	247	194
DL5RMH	"	76,944	202	168
DC3HB	"	56,170	166	137
DL5RBR	"	48,100	155	130
DJ5IW	"	44,688	140	133
DG6NEL	"	27,606	117	107
DL1RG	"	12,460	73	70
DJ2MX	"	8,722	57	49
DF8AA	"	4,560	49	48
DF5AU	"	2,726	32	29
DL3TD	21	2,137,194	1281	666
DL8MUG	"	10,140	65	60
DJ8OG	14	2,781,828	1654	747
DL3LAB	"	99,452	283	188
DL2QT	"	71,162	227	182
DJ6QT	"	36,920	158	130
DL4CF	"	3,780	44	42
DJ1AA	7	1,093,247	1014	467
DL9AWI	"	19,180	77	70
*DL2RMC	A	1,366,965	1191	555
*DK5DQ	A	1,269,696	1072	544
*DB8NI	A	840,788	872	481
*DJ9MH	"	729,492	752	444
*DL8PAF	"	488,565	596	385
			(Op: DJ8GM)	
*DC7NF	"	402,215	555	355
*DM2SR	"	291,096	454	311
*DF2FM	"	287,433	414	293
*DD1JN/P	"	230,972	393	292
*DH2MA	"	202,247	390	263
*DH5AO	"	201,575	374	275
*DL1ARJ	"	173,761	356	241
*DK6AY	"	155,445	329	241
*DL9GWD	"	150,500	305	215
*DL5DD	"	123,966	289	213
*DK8EY	"	122,941	254	193
*DLØNQ	"	112,682	276	206
*DL1BBO	"	110,200	254	190
*DF6WE	"	109,752	276	204
*DM2BPG	"	95,160	255	195
*DM5JBN	"	78,754	204	169
*DL3ZAI	"	78,411	244	177
*DL3SCN	"	77,805	231	171
*DL8HCO	"	52,626	194	147
*DL1TS	"	44,014	141	118
*DL6NAL	"	42,390	159	135
*DL8UFO	"	38,640	133	120
*DL1APX	"	30,015	135	115
*DL5AZZ	"	28,080	132	108
*DL2DVL	"	23,845	119	95
*DH3FAW	"	22,638	103	98
*DM2AWM	"	18,540	96	90
*DB7TF	"	14,691	95	83
*DH6DAO	"	14,555	85	71
*DK4VY	"	11,700	82	78
*DL1AWC	"	11,388	81	73
*DGØLFG	"	9,576	67	63
*DL8UGF	"	6,157	51	47
*DL2ZA	"	5,733	58	49
*DJ4MH	"	4,655	51	49
*DL7UXG	"	4,346	45	41
*DN2RMC	"	3,332	37	34
*DL1DTC	"	2,784	34	29
*DG7RO	"	1,220	21	20
*DL8CA	"	1,035	23	23
*DL3BRA	21	18,688	98	73
*DL2DYL	"	3,036	34	33
*DL1DTL	"	1,971	27	27
*DB6FO	14	61,420	244	166
*DL4GBA	14	39,339	169	141
*DH2PG	"	13,500	100	90
*DL1DXF	"	5,586	52	49
*DL7CU	"	4,214	50	49
*DK2AB	"	3,900	59	52
*DL5AWI	"	1,848	32	28
*DL8WAA	"	168	12	12
*DJ6XB	"	3	1	1
*DL4VAI	7	32,318	129	113
*DF1IAQ	3.7	42,510	146	130

SPAIN

EA5DFV	A	5,128,116	2542	861
EA4KR	A	4,577,156	2381	838
EA3OR	A	461,840	532	368
AN1AAW	"	399,456	492	342
EA3DUM	"	107,915	234	191
EA5FID	"	52,836	137	111
EA7ATX	21	1,239,768	1053	536
AM7HF	21	965,675	891	535
			(Op: EA7HF)	
EA2BOV	"	717,990	751	390
AN1EJ	14	492,588	810	424
			(Op: EA1EJ)	
EA3CI	7	1,084,356	790	458
EA7HY	7	584,010	469	309
EA3BOX	"	496,272	506	336
EA1JO	3.7	15,826	85	82
*ED1WS	A	1,320,917	1020	559
			(Op: EA1WS)	
*EA2AYD	A	953,865	865	517
*EA1AJV	A	432,068	560	364
*AN1BXQ	"	397,114	534	362
*AN2ARW	"	381,150	524	350
*EA4TV	"	301,103	482	341
*AN1AUM	"	299,376	580	308
*EC7ABV	"	276,900	496	325
*AM7EWX	"	260,775	419	285
*AN7AFM	"	248,412	504	326
*EA3NA	"	223,440	374	285
*EA4TD	"	197,200	453	290
*EA1GAR	"	166,770	374	255
*EA4EJR	"	130,582	294	218
*EA2PA	"	127,656	260	197
*AN1TU	"	107,800	221	200
*EA5KV	"	82,110	204	170
*EA7CWA	"	81,054	189	158
*EA2CNU	"	65,108	187	164
*EA1BZP	"	61,992	203	168
*EA7FRX	"	51,350	151	130
*EA7GGU	"	47,278	178	154
*EA3DEN	"	44,187	154	143
*AM1CNF	"	37,236	137	107
*EA5ETP	"	36,778	153	142
*EA2AVM	"	32,207	130	107
*EA1EVS	"	29,760	143	124
*EA2BNU	"	28,080	117	104
*EC1DMY	"	24,192	130	108
*EA3WX	"	22,148	102	98
*EC1AJS	"	21,736	119	104
*EA3FHP	"	20,350	119	110
*EA1AHA	"	9,686	66	58
*EC7DDZ	"	7,410	60	57
*EA4CIE	"	5,832	56	54
*EC1AEG	"	1,250	26	25
*EA7EYQ	"	1,121	21	19
*AM7HBP	28	42,834	144	121
			(Op: EA7HBP)	
*EA5DIT	"	10,010	64	55
*EA7GV	"	4,810	44	37
*EF7ALW	21	377,754	662	377
*EC7AKV	21	114,456	318	228
*EA1BIM	"	20,400	90	85
*EA5FOS	"	12,888	73	72
*EA4CT	"	12,482	88	79
*EA7ANM	"	7,866	82	69
*EF3PL	"	7,747	71	61
*EC1DGX	"	4,784	50	46
*EC1DMQ	"	2,442	34	33
*EC2AH	"	363	11	11
*EA1CS	14	271,173	523	349
*EA1ASG	"	157,462	309	262
*EA5GFK	"	29,799	149	129
*EA7IA	"	26,568	132	123
*EA5BY	7	16,008	70	58
*AM1JJ	3.7	59,220	177	141
*EA5EOR	3.7	52,029	159	141
*EC1CSC	"	496	18	16

IRELAND

*EI6JK	A	687,280	749	440
*EI7CC	"	138,920	318	230
*EI7JK	"	67,408	239	176
*EI4CF	21	153,232	326	244
*EI4IS	14	56,677	183	157
*EI/DL5AUA	7	3,220	36	35
*EI9JN	3.7	101,332	251	188

MOLDOVA

*ER3CT	A	344,850	544	330
*ER3ZZ	"	22,088	103	88
*ER5DX	28	1,638	26	21

ESTONIA

ES5TV	A	4,372,415	2489	965
ES1AJ	A	1,628,319	1364	627
ES4RD	14	12,324	92	79
*ES6KW	A	183,696	367	258
*ES8DH	A	74,328	206	163
*ES8SW	"	54,750	193	146
*ES7FU	"	30,438	138	114
*ES6RMR	"	28,767	144	129
*ES6CO	"	14,250	83	75
*ES5CX	21	4,725	49	35
*ES1IP	"	1,188	22	22
*ES5RIM	14	13,736	106	101

BELARUS

EU1PA	A	1,559,896	1289	566
EW3LN	"	194,208	332	238
EW7KR	14	37,660	173	140
EU1CJ	3.7	175,474	335	221
*EW5MM	A	436,644	584	351
*EU2MM	A	433,752	550	318
*EU4LY	"	203,775	367	247
*EU6NN	"	40,086	152	131
*EW1KT	"	38,528	136	112
*EW6GL	"	2,944	34	32
*EW6CU	28	3,248	38	29
*EW1ABF	"	1,104	23	16
*EW5AF	14	1,952	33	32
*EU6AA	"	540	18	18
*EW6AW	7	936	18	18
*EV6M	1.8	3,330	39	37

FRANCE

TM5A	A	1,181,775	1002	525
			(Op: F5VHJ)	
F5BBD	A	829,980	828	477
F8BDQ	"	269,326	492	311
*F8AKS	A	1,958,426	1272	634
*F5KEE	A	466,260	561	380
			(Op: F1CGN)	
*F6DRP	A	464,196	508	414
*F6FTB	"	377,440	507	337
*F1FPL	"	290,470	459	310
*F6BAT	"	224,068	389	278
*F4DLL	"	166,400	338	260
*F5LIW	"	130,168	269	212
*F4BKV	"	35,125	143	125
*F5MLJ	"	29,268	118	108
*F4CPF	"	27,675	125	123
*F1TRE	"	19,096	97	88
*F1IWH	"	13,311	94	87
*F8DYD	"	11,968	72	68
*F1ADG	"	7,424	63	58

ENGLAND

G3XTT	A	1,203,320	997	536
MØWLF	A	1,122,408	1030	504
GØMTN	A	1,036,152	1038	533
MØCCE	"	277,760	458	310
G3AB	"	15,124	82	76
MØWKR	14	1,225,887	1057	559
MXØCYB/P	"	64,798	228	179
			(Op: GØVQR)	
*2EØATY	A	776,440	1029	470
*M3VZT	A	305,915	479	305
*G4DFI	A	263,417	440	311
*G4DBW	"	117,450	299	225
*G4NXG/M	"	101,195	225	185
*MØBLF	"	91,739	267	199
*G4SGI	"	73,667	223	181
*GØMRH	"	51,810	199	157
*MØOIC	"	29,884	138	124
*MØLET	"	26,752	136	128
*M3TGS	"	25,916	137	124
*G8YTC	"	18,644	137	118
*2EØTEC	"	13,992	109	88
*M1MAJ	"	10,578	85	82
*G6CSY	"	6,954	66	61
*M1SMH	"	6,493	47	43
*G/VE3VO	"	3,268	47	43
*MØTDG/P	"	432	18	18
*G4AXX	14	10,823	89	79
*M5W	7	107,512	258	178
			(Op: MØMCX)	
*G4ZOB	"	25,404	96	87
*MØEZP	1.8	325	13	13

NORTHERN IRELAND

*GI4AAM	A	148,338	352	246

SCOTLAND

GM7V	A	2,020,572	1394	636
MM1DHU	A	940,382	869	482
MM5AHO	"	163,586	348	263
GM2W	"	162,134	363	259
			(Op: GMØTGE)	
MM1APX	14	934,349	1115	533
MMØEAX	3.7	747,250	753	427
GM4AFF	"	420,090	516	335
*2MØGUL	A	111,981	295	229
*MMØEDZ	"	35,560	172	140
*GM4UYZ	"	8,632	90	83
*GM7TUD	21	87,478	222	191
*MMØBSM	"	5,405	51	47

GUERNSEY

MU2Z	14	1,259,014	1242	577
			(Op: M5RIC)	
GU4EON	3.7	116,427	256	197
*MUØFAL	A	104,856	273	204
*2UØGSY	"	41,902	178	146

WALES

*MWØYDX	A	111,573	253	207
*GW3YVC	"	47,304	167	146

HUNGARY

HAØDU	A	3,509,818	1805	793
HG8W	A	715,233	704	419
			(Op: HA8ZO)	
HA8A	"	273,822	390	282
HG8R	3.7	1,505,916	1127	531
*HA6IAM	A	422,352	575	336
*HA8CQ	"	100,392	251	178
*HA3LI	"	14,559	73	69
*HG8L	14	1,012,350	1089	510
*HA1ZN	"	502,544	738	392

SWITZERLAND

HB9OCR	A	786,824	846	472
*HB9TQG	A	444,105	589	355
*HB9AYZ	"	1,488	32	31

ITALY

IK2SND	A	933,075	941	495
IO8SRM	A	206,080	445	280
*IZ4EKI	"	136,904	312	218
*IZØBNR	"	29,403	129	121
*IK8NBL	"	14,875	95	85
*IZ1DLY	"	1,581	31	31
*IZ5AJP	14	3,526	43	43

NORWAY

LA9VDA	A	1,278,765	1014	543
LA2MJA	14	75,375	241	201
LA6FJA	"	9,200	87	80
LN7AZ	28	1,491	25	21
			(Op: LA6FJA)	
*LB8AE	A	180,891	297	203
*LA7GNA	"	21,624	128	106
*LA1QDA	14	225	9	9
*LN5G	3.7	18	3	3
			(Op: LA6FJA)	

LUXEMBOURG

LX7I	A	6,739,000	2646	920
			(Op: LX2AJ)	
LX5T	7	1,664,026	1230	533

LITHUANIA

LY2FN	A	494,960	610	368
LY4CW	A	489,280	628	352
LY2MM	"	448,125	571	375
LY2CO	"	115,048	267	197
LY1CX	"	84,488	264	179
LY3BP	"	32,552	115	104
LY2DM	21	457,688	562	308
LY2IJ	1.8	71,371	202	149
LY2OU	1.8	28,764	132	102
*LY1DT	A	449,575	588	367
*LY2AT	A	168,750	346	250
*LY2OM	"	133,980	292	203
*LY3CY	"	67,686	209	174
*LY1DJ	"	58,575	214	165
*LY1CT	"	29,155	140	119
*LY2TX	"	14,186	93	82
*LYØA	14	1,003,405	1093	559
*LY2TE	14	426,754	662	379
*LY2LF	"	39,780	170	130
*LY5A	3.7	687,695	749	395
			(Op: LY2PAJ)	

BULGARIA

LZ1BJ	A	480,480	648	390
LZ1ABC	"	38,544	156	132
LZ1YG	21	199,017	397	243
*LZ1AQ	A	89,100	253	180
*LZ2BE	A	48,576	178	138
*LZ5PL	"	40,740	188	140
*LZ3SM	"	22,230	103	90
*LZ1PM	"	4,004	50	44
*LZ2JA	28	9,735	63	55
*LZ7H	14	6,798	73	66
*LZ3YY	"	640	20	20
*LZ7Z	7	5,590	45	43
			(Op: LZ1EP)	

AUSTRIA

OE5ØCWL	A	1,926,400	1318	640
			(Op: OE5CWL)	
OE5ØAJT	"	352,600	516	344
OE6Z	14	4,675,242	2475	858
*OE5ØJTB	A	187,659	350	261
*OE8WOQ	A	55,945	219	167
*OE8OLK	"	25,272	134	117
*OE5ØWWL	"	6,327	61	57
			(Op: OE5WWL)	
*OE2UL	"	5,225	63	55

FINLAND

OH1F	A	4,331,449	2254	823
			(Op: OH1NOA)	
OH8L	A	3,152,340	2049	747
			(Op: OH8LQ)	
OH1BV	A	811,224	871	456
OH5DX	"	388,892	556	301
OH4MCV	"	116,116	258	203
OH3JR	"	108,976	238	196
OH5BM	21	1,444,256	1160	484
OH8NC	14	3,652,294	2261	862
OH3BU	"	496,218	812	433
OH7M	7	1,567,956	1126	529
			(Op: OH7WV)	
*OH2FS	A	174,885	287	267
*OH5NS	"	30,800	129	112
*OH6GFI	"	5,461	51	43
*OH6LHB	21	108,647	275	187
*OH4TY	14	89,284	280	221

ALAND IS.

OHØZ	A	8,130,528	3403	1008
			(Op: LY2TA)	
OHØR	14	2,043,415	1739	701
			(Op: OH2TA)	

CZECH REPUBLIC

OK1RI	A	9,338,220	3187	1039
OK1EP	A	1,492,487	1160	569
OK1FRO	"	56,416	203	164
OK1BN	21	1,206,950	926	505
OK2ABU	"	56,261	173	127
OK5DX	1.8	635,660	775	370
			(Op: OK1MU)	
*OK2PTZ	A	704,700	776	435
*OK2MBP	A	691,900	830	407
*OK1AY	A	638,724	697	404
*OK1BA	"	213,248	391	272
*OK2BRX	"	165,627	312	239
*OK2PPM	"	111,162	256	194
*OK2TCW	"	100,130	236	190
*OK2BDF	"	75,168	188	162
			(Op: OK2OP)	
*OK2VX	"	59,202	192	143
*OK1DKO	"	38,902	138	106
*OK1CJN	"	36,630	133	111
*OK2BQL	"	30,128	135	112
*OK2WYK	"	21,855	112	93
*OK2PBG	"	18,018	86	77
*OK1TRM	"	15,015	98	91
*OK1KZ	28	36	4	3
*OK1DKA	21	111,864	244	177
*OK2BRA	14	78,166	238	187
*OK2TBC	"	35,910	172	135
*OK1MMN	"	21,049	105	97
*OL6T	7	660,211	720	397
			(Op: OK1DCF)	
*OK1CLD	3.7	5,940	53	48
*OK2HZ	1.8	68,211	215	159
*OL6P	1.8	32,430	150	115
			(Op: OK2WTM)	
*OK2BEN	"	30,081	137	111

SLOVAKIA

*OM4DN	A	502,304	694	352
*OM3LO	A	452,748	555	348
*OM7YC	"	161,170	310	227
*OM4DA	"	58,982	204	154
*OM7AT	"	37,465	163	127
*OM3KWZ	"	11,280	64	60
			(Op: OM7AA)	
*OM5FA	28	1,360	24	20
*OM4WW	14	75,447	251	181
*OM7AB	3.7	306,308	482	292
*OM6TY	"	226,630	394	262

BELGIUM

OO5SY	A	172,140	391	228
			(Op: ON5SY)	
OO4BR	1.8	741	20	19
			(Op: ON4BR)	
*ON7BS	A	363,303	542	333
*ON4AST	A	78,142	214	178
*OO6UU	"	56,575	193	155
			(Op: ON6UU)	
*ON5SV	"	40,959	158	123
*ON4KVA	"	7,130	66	62
*ON6LEO	21	6,864	54	52
*OO6LY	14	2,520	48	45
*OO7YX	3.7	312,872	497	296

FAROE IS.

OY1CT	A	57,905	250	185

DENMARK

OZ5EV	A	554,457	577	439
OZ4RT	"	43,952	151	134
OZ5E	21	203,196	362	246
			(Op: OZ1XJ)	
*OZ1ACB	A	300,737	477	311
*OZ2DAN	A	100,738	275	209
*OZØSW	"	92,904	260	196
*OZØKY	"	35,028	147	139
*OZ4EL	"	30,916	150	131
*OZ8AE	21	32,704	125	112
*OZ1JVX	14	45,428	203	164

THE NETHERLANDS

PAØJNH	A	384,476	546	347
PC4M	A	72,760	216	179
PA5TT	"	21,012	112	102
PAØLOU	"	20,070	94	90
PAØIJM	3.7	454,950	616	337
*PAØAGA	A	592,224	693	398
*PF9A	A	539,523	690	397
*PG3N	A	510,734	664	382
*PA3AAV	"	232,352	389	274
*PG7V	"	191,544	342	276
*PAØLRK	"	73,667	205	181
*PA7AL	"	69,480	221	180
*PA2R	"	38,880	138	120
*PA3GBI	"	29,880	147	120
*PA1PAT	"	29,016	142	117
*PAØOI	"	22,568	114	104
*PG2AA	"	16,530	98	87
*PA3HGF	"	8,505	70	63
*PA2SWL	"	1,980	30	30
*PA9HR	"	602	15	14
*PAØKDM	21	490	15	14
*PA2CHM	7	1,200	25	24

SLOVENIA

S58A	A	9,561,284	3335	1009
			(Op: S55OO)	
S59KW	7	2,105,473	1186	577
S51OI	7	1,968,800	1157	575
S5BC	3.7	1,602,152	1233	542
			(Op: S53MM)	
S57O	3.7	646,129	687	389
S57DX	1.8	431,313	600	327
S57M	1.8	406,065	568	321
*S57NRO	A	767,360	797	436
*S57MTA	A	747,117	696	469
*S57S	28	78,600	222	150
*S57OAM	21	704,090	716	389
*S51DX	14	535,621	703	433
*S57AL	"	110,279	287	221
*S58L	"	67,550	238	175
*S53F	3.7	587,121	692	381

SWEDEN

SMØW	A	2,193,273	1488	643
			(Op: SMØWKA)	
SM3W	A	1,890,595	1377	665
			(Op: SM3WMV)	
SM3LJV	"	284,254	509	311
SM5U	"	224,455	398	265
			(Op: SM5UGC)	
SM7CQY	"	159,850	322	230
SM7DXQ	"	139,722	290	219
8S6E	"	101,080	251	190
			(Op: SM6FUD)	
SM3FJF	"	77,464	241	184
SM7BJW	"	22,601	117	97
SF5BA	14	817,119	977	489
			(Op: SM7CRW)	
8S5A	3.7	554,537	693	367
8S5X	1.8	5,950	52	50
			(Op: SM5HJZ)	
*SM6U	A	440,190	594	365
			(Op: SM6YOU)	
*SMØR	A	143,395	350	241
			(Op: SMØRUX)	
*SMØB	"	82,812	250	201
			(Op: SM5QU)	
*SA5Y	"	46,953	188	141
*SM3XRB	"	28,188	154	116
*8SØW	"	26,132	109	94
			(Op: SMØNJO)	
*SM6RXZ	"	14,520	99	88
*SMØFM	"	10,850	74	70
*SA3D	"	2,100	33	30
			(Op: SM3WMU)	
*SM3EAE	"	1,540	32	28
*SM2MZC	"	1,504	33	32
*SL5ZXR	21	48	5	6
			(Op: SM5ARR)	
*SM5DQE	14	96,728	295	226
*SM6E	"	11,508	87	84
			(Op: SM6FUD)	
*SM2T	7	66,120	173	152
*7S7V	3.7	902,956	918	436
*SA3R	"	17,922	101	87
			(Op: SM3CER)	

POLAND

SP3GXH	A	764,757	771	427
SP5GMM	A	167,642	290	218
SN75JMR	"	66,411	200	157

SP6IEQ	*	25,584	102	82
SP6RLK	*	14,925	77	75
SP4AVG	*	7,200	68	60
SP9QMP	**14**	**1,666,528**	**1359**	**608**
SN2R	**7**	**21,976**	**94**	**82**
			(Op: SP2QCR)	
SP4JTJ	*	17,608	75	71
SN3A	**3.7**	**2,369,664**	**1358**	**612**
			(Op: SP3GEM)	
SN7Q	**3.7**	**2,031,386**	**1308**	**574**
SQ4MP	*	892,143	919	441
SO2R	**1.8**	**756,105**	**851**	**399**
			(Op: SP2FAX)	
***SQ9JKW**	**A**	**1,166,790**	**996**	**534**
***SQ9IDE**	**A**	**622,635**	**706**	**403**
***SQ9MZ**	**A**	**469,924**	**583**	**364**
*3Z75Z	*	340,275	485	325
*SP4GFG	*	320,568	505	296
*SP2DNI	*	286,080	457	298
*3Z75GFI	*	271,963	458	283
			(Op: SP9GFI)	
*SP75MVG	*	202,752	393	264
			(Op: SP1MVG)	
*SP1DID	*	186,206	370	253
*SQ8FEW	*	181,720	390	236
*SQ9ANS	*	131,440	292	212
*SP1DTE	*	125,756	311	211
*SP2FTL	*	124,068	287	196
*SQ9FCH	*	105,408	279	192
*SP5XSD	*	82,992	216	152
*SP6TRX	*	71,288	197	152
*SP4Z	*	57,685	159	139
*SP2GJI	*	52,930	160	134
*SP4PBI	*	48,678	143	133
			(Op: SP4-17-001)	
*SP3BVI	*	45,495	193	135
*SP1RW	*	42,333	167	137
*SQ6IU	*	38,376	147	123
*SP8ONB	*	33,005	139	115
*SP9LWH	*	24,926	117	103
*SP6NVK	*	19,694	111	86
*SQ8T	*	16,848	92	81
*SP8HPW	*	16,351	91	83
*SP5TAT	*	8,624	69	56
*SP9KJU	*	7,685	63	53
*SP1HJK	*	6,880	45	43
*SP5XOV	*	6,372	59	59
*SP9IKN	*	6,188	73	52
*SQ9ITH	*	5,916	59	51
*SQ6IUQ	*	3,145	43	37
*SP1DTG	*	616	12	11
***SQ6ELV**	**28**	**7,567**	**59**	**47**
***SQ9CWO**	**28**	**7,567**	**57**	**47**
*SP2EXN	*	4,800	46	40
*SQ9CNN	*	2,511	31	27
*SQ9HQ	*	2,325	33	25
*SP4DC	*	408	12	12
***SP2AVE**	**21**	**23,716**	**116**	**77**
***SP2AYC**	**21**	**23,352**	**108**	**84**
*SP9UMJ	*	8,965	55	55
***SP9EWO**	**14**	**174,106**	**374**	**263**
***SQ3RX**	**14**	**163,750**	**395**	**250**
*SQ1WO	*	73,164	274	182
*SP4AAZ	*	57,281	203	167
*SP5DRE	*	18,335	111	95
*SP9RTL	*	14,742	114	91
*SP9PTG	*	714	24	21
*SP9KGG	*	480	22	15
*SP7LHX	*	228	15	12
*SQ9CWN	*	1	1	1
***SP3DL**	**7**	**37,848**	**123**	**114**
***SP3GTS**	**7**	**27,930**	**114**	**105**
*SP4LVK	*	598	13	13
***SQ9JKS**	**3.7**	**121,011**	**291**	**209**
***SP9UOP**	**3.7**	**108,350**	**271**	**197**
*SQ9C	*	83,838	241	178
*SQ9UM	*	25,100	124	100
*SQ8IN	*	7,620	62	60
*SP9P	*	1,032	24	24

GREECE

SV1DPI	**A**	**187,404**	**456**	**276**
SV1GRD	*	9,880	71	65
***SV1NK**	**A**	**219,474**	**404**	**267**
***SZ6P**	**14**	**95,816**	**303**	**232**
			(Op: SV1BJW)	

CRETE

SV9FBM	**A**	**1,298,000**	**1356**	**550**

BOSNIA & HERZEGOVINA

T9ØO	**21**	**2,128,788**	**1346**	**621**
			(Op: T94DU)	
T97M	**7**	**877,485**	**687**	**411**
***T93Y**	**A**	**98,072**	**215**	**184**
***T98R**	**28**	**1,344**	**22**	**21**
***T94DO**	**7**	**1,539,894**	**1165**	**527**
***T94LW**	**3.7**	**332,408**	**506**	**296**

TURKEY (EUROPEAN)

TA1FA	**21**	**196,176**	**426**	**244**

ICELAND

TF3AM	**A**	**126,525**	**317**	**241**
TF3AO	*	32,480	174	140
TF3MA	**14**	**59,596**	**225**	**188**
***TF3XEN**	**A**	**282,360**	**590**	**362**

EUROPEAN RUSSIA

RK4FD	**A**	**6,480,218**	**3130**	**982**
RW1AC	**A**	**2,973,209**	**1765**	**751**
RV1AW	**A**	**2,956,674**	**1960**	**707**
RN6CD	*	1,482,048	1422	558
UA3TCJ	*	1,416,136	1047	458
UA4NCI	*	757,884	906	461
RZ1AWT	*	738,816	856	444
			(Op: UA1ARX)	
RN3ZC	*	408,444	531	337
RU3DX	*	339,900	502	309
RK3TT	*	330,597	580	337
UA3BM	*	224,104	341	257
UA4LY	*	223,317	340	243
UA4NC	*	154,874	302	211
RA3TT	*	154,504	327	248
RX3MA	*	125,837	245	179
RK3DK	*	125,504	316	212
RV3NA	*	102,508	223	196
RL3AW	*	100,130	198	190
RA4LW	*	52,884	148	113
RV1CC	*	49,569	149	123
UA6LTI	*	42,018	173	141
RN3OG	*	40,553	134	107
UA4RZ	*	30,086	121	98
RA3LAL	*	25,149	102	83
UA3DEE	*	18,542	98	73
RA3UT	*	1,575	25	25
RW6FO	*	864	18	16
RA3IS	*	272	9	8
RZ4HN	**21**	**1,000,404**	**1122**	**531**
UA1CKC	*	173,304	325	232
RD3A	**14**	**2,939,480**	**1950**	**860**
			(Op: RD3AF)	
RA3CW	**14**	**992,348**	**1140**	**581**
RA6DB	*	714,378	928	511
RA4LBS	*	435,690	668	423
RZ3AZ	*	431,112	726	426
RN4AD	*	423,330	684	411
RK1AM	*	60,680	246	185
RA6AK	**3.7**	**190,216**	**341**	**236**
RA6AFB	**3.7**	**109,048**	**252**	**172**
RX3OM	*	26,964	122	107
UA6AKD	*	23,250	118	93
RW6HJV	*	17,600	96	88
RN3ZJJ	**1.8**	**8,460**	**108**	**45**
***UA4FER**	**A**	**2,541,096**	**1908**	**696**
***RU3QW**	**A**	**1,494,640**	**1343**	**595**
***UA4FRL**	**A**	**1,300,102**	**1280**	**566**
*RV3FF	*	1,280,817	1183	549
*RW3GB	*	1,132,032	1126	528
*RN4WA	*	1,067,088	1426	516
*UA3ABJ	*	929,856	860	464
*RW3GU	*	543,752	721	407
*RV3QX	*	306,778	490	314
*UA4ACP	*	301,788	580	332
*UA3LHL	*	301,474	468	307
*UA4FEN	*	301,392	499	312
*UA4LU	*	281,065	495	335
*RW1CW	*	242,471	477	289
*RA4LE	*	212,232	445	296
*UA4LA	*	208,824	388	264
*RN4ACQ	*	189,372	393	258
*RZ3DA	*	179,304	317	241
*RK4HD	*	175,423	290	289
*RU3DVR	*	154,481	326	241
*RV4HC	*	141,840	356	240
*RZ1AU	*	130,592	312	212
*RW3DL	*	127,908	310	228
*UA4AN	*	123,998	341	238
*RV3IC	*	123,319	307	223
*RZ3FR	*	119,548	295	209
*RV3YR	*	118,152	291	216
*UA3BZ	*	110,208	235	192
*RA3AS	*	101,600	274	200
*UA6ECU	*	99,552	260	183
*RN3RQ	*	97,012	248	158
*RV3LA	*	95,632	246	172
*RV1CB	*	95,256	242	189
*RN3RF	*	84,816	233	171
*RV3LO	*	82,792	206	158
*RU6LG	*	78,057	226	177
*UA3WHF	*	72,420	186	142
*UA3MEJ	*	71,736	180	147
*RU4WE	*	67,032	223	171
*RD3AY	*	59,325	225	175
*RZ3DO	*	57,288	188	154
*RX3MM	*	56,984	165	136
*RU3DM	*	53,950	182	130
*RA3MB	*	53,865	165	135
*UA3UBT	*	52,479	196	147
*RU3VD	*	44,840	144	118
*UA4SX	*	41,540	164	124
*UA1AFZ	*	40,848	161	138
*RZ3EC	*	30,749	114	97
*RN6FK	*	29,481	106	93
*RA3FD	*	28,944	131	108
*RV3MI	*	22,900	111	100
*RN4AM	*	18,816	111	96
*RA1OD	*	13,350	82	75
*UA3VHO	*	10,658	76	73
*UA6HON	*	9,956	96	76
*RV4LS	*	9,275	61	53
*RW4LQ	*	9,240	64	55
*RA6CO	*	8,184	70	62
*RV3DCL	*	8,001	69	63
*RA1QDP	*	7,314	59	53
*UA3VFI	*	4,920	64	60
*RA4NCC	*	3,915	49	45
*RA3APP	*	2,730	37	35
*RK6MY	*	2,380	37	35
*RA6AAW	*	1,870	26	22
*RA6XB	*	1,276	22	22
*RX4HX	*	1,014	27	26
*RW3SU	*	240	10	8
***UA6ADC**	**28**	**44,109**	**149**	**117**
*UA3AGU	*	7,200	54	45
*RU3XB	*	3,420	38	30
*RA3XO	*	935	19	17
***RZ6FA**	**21**	**1,002,030**	**1039**	**526**
***RW3XZ**	**21**	**124,800**	**274**	**192**
*RK3XWD	*	115,232	250	208
*RT3T	*	17,600	100	100
*UA4LW	*	17,444	102	98
*RA3DGH	*	13,612	98	83
*RW4FX	*	11,524	70	67
*UA3AKI	*	8	2	2
***RU4PN**	**14**	**230,408**	**550**	**332**
***RX3DBG**	**14**	**187,561**	**401**	**289**
*RU6MD	*	180,000	414	300
*RW6AH	*	98,857	305	209
*UA4WEV	*	90,720	288	216
*RN3AQ	*	14,596	100	82
*RA3UAG	*	4,437	53	51
***UA6BAE**	**7**	**11,280**	**61**	**60**
***UA3AAP**	**1.8**	**13,392**	**90**	**72**
*UA6BQD	*	5,076	53	47
*RA3REZ	*	384	12	12

KALININGRADSK

***RA2FIA**	**A**	**34,026**	**139**	**107**
*UA2FCT	*	17,928	108	83
***RK2FXG**	**7**	**40,992**	**148**	**122**
***RU2FL**	**21**	**87,780**	**222**	**154**

UKRAINE

US5D	**A**	**4,395,087**	**2215**	**837**
			(Op: UT7DX)	
UY5ZZ	**A**	**2,601,918**	**1846**	**773**
UW2M	**A**	**1,667,530**	**1255**	**578**
			(Op: URØMC)	
UW1GZ	*	1,622,948	1407	604
UT6IS	*	913,702	963	461
UR5ZLK	*	534,360	639	365
UT5UML	*	466,200	569	360
UT2UZ	*	361,760	455	323
UT5ECZ	*	191,456	393	248
US5UO	*	131,452	317	236
US1MM	*	94,482	229	174
UR7IRL	*	81,890	245	190
UR5ZMK	*	40,434	173	138
UR4EI	*	15,484	106	98
UR5AKU	*	1,518	23	22
UX5I	**28**	**29,892**	**132**	**94**
			(Op: UT5IZ)	
UU8JM	**21**	**1,511,895**	**1347**	**605**
			(Op: UT8NA)	
UV8M	**21**	**1,113,936**	**1158**	**552**
			(Op: UX3MR)	
EM7J	**14**	**4,452,126**	**2699**	**994**
			(Op: UT5UGR)	
UT4EK	*	149,292	374	261
UT7MD	*	22,506	126	121
UU7J	**7**	**3,389,358**	**1469**	**707**
			(Op: UU4JMG)	
UX2MK	*	15,456	72	69
UT3UA	**3.7**	**376,172**	**494**	**314**
UZ5UA	**3.7**	**266,156**	**441**	**263**
UT7QL	*	146,224	298	208
UT3SA	**1.8**	**194,416**	**398**	**232**
***UR5MNZ**	**A**	**1,042,797**	**986**	**483**
***USSII**	**A**	**835,968**	**824**	**448**
***UR6MX**	**A**	**811,644**	**847**	**478**
***UX4UA**	**A**	**598,636**	**648**	**412**
*US3IZ	*	481,875	620	375
*UR6QS	*	318,359	502	307
*UT1ML	*	233,280	410	288
*US5WEP	*	196,750	364	250
*UR8QR	*	156,545	355	239
*UY5TE	*	134,244	313	226
*UT4MW	*	116,511	295	213
*UX8IR	*	104,804	262	197
*UX5EF	*	52,480	201	128
*UX8ZA	*	49,776	180	136
*US5EEK	*	28,200	154	120
*UT1UA	*	24,628	102	94
*UR7GX	*	23,940	112	95
*UR5ZTH	*	7,056	65	56
*UR4UGL	*	572	18	11
*UT5UNY	*	429	13	13
*UT5UJY	*	128	8	8
***UR4MRD**	**28**	**28,906**	**126**	**97**
***UT4IZL**	**21**	**386,260**	**643**	**356**
			(Op: US6IFQ)	
*US7IGF	*	101,952	347	192
*UU7JN	*	19,694	99	86
***UR5HAC**	**14**	**966,456**	**1142**	**558**
***EM2U**	**14**	**786,570**	**1090**	**501**
			(Op: UY2UA)	
*UR6IJ	*	287,000	534	350
*US5QSF	*	151,256	384	259
*UU5WW	*	101,004	339	228
*UY3AW	*	37,265	165	145
***US8HZ**	**7**	**145,122**	**261**	**201**
***UU4JKY**	**3.7**	**316,240**	**451**	**295**
*UT5UKY	*	27,100	116	100
***US6IKF**	**1.8**	**5,519**	**69**	**49**

LATVIA

YL2KO	**A**	**3,650,311**	**2015**	**811**
YL2CI	*	125,649	286	207
YL2PA	**21**	**59,276**	**160**	**146**
***YL2TW**	**A**	**1,003,220**	**1019**	**515**
***YL2CR**	**A**	**320,574**	**516**	**303**
*YL2VW	*	196,762	362	262
*YL1ZJ	*	160,304	327	233
*YL3DX	*	27,724	134	116
*YL2II	*	21,816	124	108
***YL3BZ**	**21**	**60,340**	**187**	**140**
***YL5W**	**14**	**396,036**	**672**	**386**
*YL2PP	*	53,521	197	179
***YL2NK**	**7**	**9,072**	**66**	**63**

ROMANIA

YO7BGA	**A**	**53,428**	**186**	**148**
YP3A	**14**	**2,186,058**	**1964**	**713**
			(Op: YO9GJY)	
YO2RR	**21**	**339,015**	**467**	**291**
***YO3CZW**	**A**	**818,142**	**866**	**442**
***YO2KQT**	**A**	**494,832**	**662**	**366**
***YO9JIM**	**A**	**217,377**	**401**	**249**
***YO7ARY**	**A**	**130,582**	**307**	**218**
*YO7LFV	*	122,292	398	237
*YO4RST	*	87,084	210	164
*YO3CVG	*	75,651	220	167
*YO4AUP	*	29,590	132	110
*YO5PAP	*	27,264	134	96
*YO5TP	*	16,058	96	74
*YO3HOT	*	1,210	22	22
***YO3JW**	**28**	**2,380**	**31**	**28**
***YO5OHY**	**21**	**38,295**	**147**	**111**
*YO9CWY	*	21,075	115	75
***YP8A**	**14**	**1,188,320**	**1310**	**560**
			(Op: YO8TU)	
*YO4GDP	*	98,120	342	220
*YO4DAU	*	25,877	131	113
***YO8AZQ**	**7**	**17,820**	**89**	**81**
*YO9HJY	*	3,168	36	36
*YO2LGW	*	2,738	37	37
***YO2CJX**	**3.7**	**201,966**	**377**	**246**
***YO5OHZ**	**1.8**	**99,680**	**268**	**178**

SERBIA & MONTENEGRO

YT9X	**A**	**2,952**	**36**	**36**
			(Op: YZ1KA)	
YT7Z	**21**	**950,103**	**831**	**457**
			(Op: YU7EE)	
YT5J	**14**	**3,000,480**	**2074**	**760**
			(Op: YU1JW)	
YT5A	**14**	**1,609,036**	**1540**	**638**
YT7A	**7**	**2,633,995**	**1346**	**637**
			(Op: YU7GMN)	
4N2Z	**7**	**2,626,008**	**1370**	**638**
4N8A	**3.7**	**2,034,630**	**1306**	**585**
			(Op: YU1EA)	
YZØZ	**3.7**	**1,092,000**	**970**	**480**
			(Op: YU1ZZ)	
YTØT	1.8	90	6	6
***YT2MT**	**A**	**63,040**	**194**	**160**
*YUØOTC	*	836	22	22
			(Op: YU1AN)	
***YU5U**	**28**	**16,132**	**84**	**74**
*YU1LA	*	3,815	39	35
***YT1VP**	**21**	**368,046**	**477**	**322**
*YU7KM	*	43,737	155	113
***4N1N**	**14**	**1,401,366**	**1425**	**622**
			(Op: YT1BX)	
***YU7ZZ**	**14**	**1,167,774**	**1202**	**573**
***YT1LT**	**7**	**381,300**	**488**	**310**
*YU1AAV	*	299,600	405	280
			(Op: YZ1ZV)	
***YT1AD**	**3.7**	**1,268,064**	**1019**	**504**
			(Op: YU1AU)	
***YU7AV**	**3.7**	**593,072**	**654**	**367**
*YT2A	*	484,516	626	356
*YU1UO	*	124,868	273	212
***YT2W**	**1.8**	**7,524**	**62**	**57**

MACEDONIA

Z33F	**7**	**986,990**	**829**	**458**
Z36W	**3.7**	**972,704**	**931**	**452**
***Z35M**	**A**	**220,460**	**487**	**292**
***Z32AF**	**3.7**	**5,217**	**50**	**47**

ALBANIA

***ZA5G**	**A**	**291,375**	**509**	**315**

SOUTH AMERICA

GUYANA

8R1K	**A**	**10,330,480**	**3134**	**929**
			(Op: EA4BQ/OH8XX)	

TRINIDAD

9Y4W	**A**	**18,548,160**	**4825**	**1112**
			(Op: OM3TZZ)	

CHILE

CE4PBB	**28**	**1,857,600**	**1274**	**516**
***CE1L**	**A**	**862,130**	**846**	**365**
			(Op: XQ1VLY)	
*CB5A	*	296,140	401	268
***CE4NV**	**28**	**4,512**	**48**	**47**

ANTARTICA

***R1ANT**	**14**	**3,360**	**35**	**32**
			(Op: RW1AI)	

BOLIVIA

***CP1FF**	**21**	**101,493**	**221**	**179**

URUGUAY

CX7BY	**21**	**2,792,698**	**1391**	**698**

FRENCH GUIANA

FY5KE	**A**	**17,344,264**	**4837**	**1064**
			(Op: F5MZN)	

ECUADOR

***HC1JQ**	**21**	**233,240**	**340**	**238**

COLOMBIA

***HK3AXY**	**A**	**203,840**	**307**	**245**

ARGENTINA

AY8A	**A**	**4,641,329**	**2107**	**763**
LU1HF	**28**	**4,434,977**	**2103**	**731**
LU3MAM	*	230,582	372	223
LT1D	**14**	**214,200**	**366**	**294**
			(Op: LU4DJC)	
***LR1F**	**A**	**2,717,500**	**1499**	**625**
			(Op: LU5FD)	
***LU2NI**	**A**	**1,786,512**	**1129**	**546**
***LU7DR**	**A**	**623,280**	**620**	**371**
*LU5FF	*	380,996	457	308
*LU9FFZ	*	210,156	346	249
*LU6KA	*	77,356	219	166
*LU3DA	*	29,274	117	102
*LU1ARV	*	22,310	108	97
*LR1A	*	6,350	53	50
*LU7DUE	*	2,442	34	33
***LU5FII**	**28**	**1,169,412**	**924**	**446**
***L44DX**	**28**	**1,149,705**	**949**	**435**
			(Op: LW1DTZ)	
***LU1FS**	**28**	**1,119,144**	**934**	**422**
*LU6HPF	*	1,091,076	920	419
*LU6FOV	*	474,075	537	315
*LW1HDJ	*	445,712	524	313
*LU9DPM	*	34,917	137	113
***LU5EML**	**21**	**3,639,916**	**1656**	**758**
*LR1J	*	497,198	531	338

ARUBA

P43E	**A**	**5,996,124**	**2416**	**772**
***P4ØA**	**A**	**13,738,890**	**4217**	**1023**
			(Op: KK9A)	

BRAZIL

ZX2B	**A**	**8,174,796**	**2926**	**921**
			(Op: PY2MNL)	
PT7BZ	**A**	**2,487,765**	**1151**	**551**
PY7ZY	**A**	**1,923,849**	**1093**	**543**
PY3PA	*	457,840	524	295
PY3MSS	*	52,650	158	117
PY2EYE	*	34,138	124	101
PY2GA	*	33,277	116	107
PY2CM	*	27,645	113	97
PY5JO	*	11,446	70	59
PP5BB	*	450	15	15
PT5Z	**28**	**3,185,359**	**1679**	**661**
			(Op: PY5NW)	
PY1KN	**21**	**7,503,520**	**2764**	**920**
PY2OZF	*	14,440	81	76
PY2NY	**14**	**4,922,663**	**1975**	**853**
PP7ZZ	**7**	**233,682**	**235**	**174**
PP5UA	*	44,499	99	91
***ZV5K**	**A**	**972,027**	**833**	**417**
			(Op: PP5MQ)	
***PY2NA**	**A**	**426,608**	**516**	**293**
***PY2BRZ**	**A**	**301,072**	**446**	**248**
*PY7VI	*	256,229	353	257
*PY2RDM	*	212,060	356	230
*PW8OO	*	71,709	217	159
*PY2DA	*	50,568	150	129
*PY3ML	*	48,160	139	112
*PY2IQ	*	47,580	158	130
*PY2DXX	*	28,816	117	106
*PT9ZBJ	*	21,600	100	90
*PY3PAC	*	924	22	21
*PR7AP	*	686	19	14
*PY4PW	*	391	17	17
***PY2SBY**	**28**	**1,155,296**	**902**	**457**
***PU2WDX**	**28**	**466,884**	**529**	**324**
***PY2DY**	**28**	**459,660**	**522**	**326**
*PY4ZE	*	273,980	394	266
*PY2BT	*	216,678	348	231
*PP5BZ	*	59,202	166	143
*PY3YD	*	36,822	135	114
*PY2SRB	*	33,354	126	109
*PU2MXU	*	29,150	129	106
*PY2RH	*	10,985	75	65
*PY5TJ	*	3,458	39	38
*PU2TES	*	2,775	41	37
***PS8NF**	**21**	**465,975**	**513**	**327**
*PT2ND	*	326,151	415	279
*PR7FMT	*	79,278	195	146
***PR7QI**	**14**	**289,300**	**378**	**263**
*PY6KY	*	32,860	114	106
*PR7AYE	*	27,260	104	94
*PY2ZA	*	6,708	53	52
*PY3AJB	*	3,848	40	37
*PS8ET	*	2,610	32	29
***PR7BOK**	**7**	**9,120**	**41**	**40**

FALKLAND IS.

***VP8BKF**	**A**	**9,702**	**74**	**63**

VENEZUELA

4M5DX	**7**	**3,789,672**	**1222**	**538**
			(Op: YV5SSB)	
YV4DDK	*	45,390	92	89
***YY5EAH**	**A**	**390,528**	**429**	**288**
*YV5IAL	*	70,242	195	138
*YV5JBI	*	14,790	65	58
*YV5NWG	*	16	3	2
***YY5EDG**	**28**	**289,432**	**458**	**242**
*YV4YC	*	46,610	177	118
*YY5OGI	*	72	6	6
***YY5RED**	**21**	**596,580**	**652**	**326**
*YY5ADM	*	684	18	18
***YV5TX**	**14**	**966,120**	**848**	**388**
***YV5JF**	**7**	**36,900**	**86**	**82**
***YY5YMA**	**3.7**	**189,406**	**203**	**166**

PARAGUAY

ZPØR	**A**	**5,159,682**	**2183**	**759**
			(Op: ZP5AZL)	
*ZP5LOB	21	35	5	5

OCEANIA

THE PHILIPPINES

DZ1BP	**A**	**1,010,757**	**1000**	**281**
			(Op: DU1BP)	
***4F1MEU**	**A**	**1,027,752**	**950**	**374**
***DW1NJT**	**21**	**726,872**	**729**	**344**
*DV3ZQR	*	125,248	290	152
***4D9D**	**7**	**791,224**	**498**	**284**
*DW1VEU	*	1,020	16	15

SAIPAN

WHØV	**A**	**2,111,679**	**1317**	**477**
AHØ/N2IU	**A**	**2,006,851**	**1422**	**389**
			(Op: JP1JFG)	

GUAM

KG6DX	**A**	**3,754,025**	**2059**	**605**
WH2V	**A**	**2,027,822**	**1624**	**409**

HAWAII

KH6FI	**A**	**289,693**	**376**	**193**
AH7C	**A**	**153,860**	**207**	**157**
AH6HJ	*	87,048	188	117
KH6FKG	**7**	**936,900**	**593**	**270**
***KH6GMP**	**A**	**602,364**	**686**	**303**
***KH6/WDCN**	**A**	**230,860**	**367**	**194**
***NH7FY**	**14**	**160,868**	**242**	**151**

PAPUA NEW GUINEA

***P29NB**	**A**	**1,057,596**	**886**	**372**

MARSHALL IS.

V73JY	**A**	**174,800**	**390**	**152**
***V73KJ**	**28**	**46,822**	**195**	**82**

AUSTRALIA

VK3TZ	**A**	**2,402,001**	**1324**	**537**
VK6KK	**A**	**287,820**	**410**	**246**
VK2GWK	**A**	**60,060**	**164**	**130**
VK2CZ	**7**	**37,146**	**91**	**82**
***VK8AV**	**A**	**63,516**	**148**	**134**
***VK4XES**	**A**	**54,808**	**149**	**124**
***VK2KDP**	**A**	**27,945**	**118**	**81**
***VK3AVV**	**A**	**6,390**	**48**	**45**
***VK4FJ**	**21**	**51,597**	**155**	**117**
***VK7VH**	**14**	**82,478**	**186**	**163**

INDONESIA

YB1AR	**A**	**890,226**	**733**	**411**
YB1TC	**A**	**404,420**	**475**	**292**
YC8JDW/1	**21**	**115,767**	**237**	**171**
YB1YG	*	79,094	187	142
***YBØECT**	**A**	**1,389,852**	**1030**	**459**
***YBØWWW**	**A**	**613,868**	**635**	**332**
*YB2VTO	*	381,131	504	257
***YB1BAD**	**21**	**1,747,724**	**1166**	**506**
***YB2OBL**	**21**	**1,480,455**	**1009**	**501**
*YC2WBF	*	203,424	340	208
*YC2ECG	*	70,738	218	113
***YB2DX**	**14**	**464,091**	**477**	**339**
*YBØIR	*	47,520	134	120
*YB1BOD	*	35,203	117	107
*YC2MXV	3.7	130	5	5

NEW ZEALAND

ZL2UO	**A**	**597,534**	**534**	**347**
ZL1ANH	**A**	**138,827**	**235**	**181**
***ZL4PW**	**A**	**701,892**	**600**	**402**
***ZL2AL**	**A**	**244,426**	**347**	**238**
***ZL3TE**	**7**	**115,542**	**176**	**131**
			(Op: W3SE)	

TRIBANDER/SINGLE ELEMENT

UNITED STATES

K1LZ	**A**	**2,303,616**	**1372**	**672**
K3TW	**A**	**1,420,100**	**1115**	**550**
N3UM	*	1,228,596	916	516
WA1JMP	*	1,085,596	837	508
NJ2F	**A**	**541,782**	**658**	**381**
W1BYH	*	485,080	518	335
NX4DG	**A**	**416,876**	**568**	**356**
W4NTI	*	350,497	499	311
W6TK	**A**	**245,488**	**526**	**268**
N2VW	**A**	**224,844**	**375**	**246**
N3HS	*	180,238	290	227
K9TR	**A**	**138,020**	**279**	**206**

4U1WB	*	132,153	328	217
			(Op: AJ3M)	
AD6KA	*	120,139	304	191
W7MGC	**A**	**113,664**	**271**	**192**
N5DD	**A**	**96,025**	**206**	**167**
KBØENE	**A**	**87,135**	**225**	**157**
N4DWK	*	78,842	182	158
NØUU	*	62,034	164	147
KØCOM	*	49,920	166	120
WAØMHJ	*	28,224	98	98
K7VI	*	24,300	123	100
KF7IQ	*	22,792	119	88
KC8IVC	**A**	**15,090**	**140**	**133**
W7LKG	*	11,786	75	71
K7MY	*	9,943	72	61
NA6Q	*	6,110	55	47
			(Op: W6SJ)	
N5PU	*	372	12	12
W7QN	**14**	**92,000**	**248**	**200**
WØCEM	**14**	**7,897**	**53**	**53**
NK4CC	**14**	**3,772**	**47**	**41**
			(Op: K4CC)	
N2GC	**7**	**27,753**	**91**	**87**
***WD5K**	**A**	**1,522,092**	**1306**	**572**
***WB8TLI**	**A**	**920,125**	**795**	**433**
*W9DX	*	506,484	656	396
***WB2RHM**	**A**	**427,652**	**551**	**331**
***KB1ILN**	**A**	**375,906**	**475**	**282**
***KE5LQ**	**A**	**289,742**	**468**	**277**
***K9JE**	**A**	**231,540**	**388**	**255**
***N7ZG**	**A**	**177,225**	**363**	**255**
*N9TTX	A	165,244	331	218
*AA7PM	*	157,182	298	201
***NØBUI**	**A**	**155,724**	**344**	**228**
*K1TN	*	141,984	293	204
***AJ1E**	**A**	**133,620**	**255**	**204**
*VE3XD/W4	*	131,580	293	204
***AAØNK**	**A**	**121,667**	**293**	**191**
***KG6TT**	**A**	**92,901**	**274**	**173**
*W9LYA	*	90,072	252	162
*WK7P	*	82,320	266	168
***KB2DE**	**A**	**80,355**	**210**	**165**
*WB5TUF	*	68,160	206	142
*KI4ACW	*	65,404	230	166
*KAØZPP	*	63,921	185	149
*KC5TA	*	55,692	183	156
*KD4ULW	*	52,264	168	139
*AA6K	*	44,988	157	138
*W9VQ	*	44,772	136	123
*K4IE	*	34,870	124	110
*NØKM	*	32,700	143	109
*N1DC	*	27,068	110	101
*WA3OFC	*	23,970	98	85
*K2RD	*	23,436	107	84
*KAØZIA	*	21,203	107	91
*K4AH	*	19,635	101	85
*K7RB	*	19,488	128	87
*W1CRK	*	19,488	99	87
*KQ7W	*	18,200	131	100
*N6RZR	*	18,146	109	86
*KB8CL	*	16,704	105	87
*N7IZ	*	16,102	105	83
*N7XY	*	15,747	107	87
*K8ZZV	*	15,189	100	83
*N2CK	*	13,056	74	68
*WM5R	*	12,900	91	75
*K7ACZ	*	11,310	71	58
*K7TR	*	8,400	56	50
*W4PI	*	7,668	56	54
*N8XTZ	*	6,032	61	52
*K2EKM	*	5,734	52	47
*W9WY	*	4,888	56	52
***KBIA**	**21**	**231,660**	**506**	**286**
***W7UPF**	**21**	**90,356**	**231**	**196**
*ABØOX	*	32	4	4
***NV8N**	**14**	**424,258**	**604**	**401**
*N8ILU	*	86,955	223	187

DX

ZX2B	**A**	**8,174,796**	**2926**	**921**
			(Op: PY2MNL)	
P43E	**A**	**5,996,124**	**2416**	**772**
ZPØR	**A**	**5,159,682**	**2183**	**759**
			(Op: ZP5AZL)	
AY8A	**A**	**4,641,329**	**2107**	**763**
KG6OX	**A**	**3,754,025**	**2059**	**605**
HAØDU	**A**	**3,509,818**	**1805**	**793**
NP2I	**A**	**3,501,386**	**2149**	**653**
VK3TZ	**A**	**2,402,001**	**1324**	**537**
WH2V	*	2,027,822	1624	409
UA9CMQ	**A**	**2,007,490**	**1248**	**547**
AHØ/N2IU	**A**	**2,006,851**	**1422**	**389**
			(Op: JP1JFG)	
OE5ØCWL	**A**	**1,926,400**	**1318**	**640**
			(Op: OE5CWL)	
PY7ZY	*	1,923,849	1093	543
DF3KV	**A**	**1,895,234**	**1261**	**622**
VE3CR	**A**	**1,710,786**	**1058**	**539**
OK1EP	**A**	**1,492,487**	**1160**	**569**
SV9FBM	**A**	**1,298,000**	**1356**	**550**
G3XTT	**A**	**1,203,320**	**997**	**536**
MØWLF	*	1,122,408	1030	504
GØMTN	*	1,036,152	1038	533
YB1AR	**A**	**890,226**	**733**	**411**
AL9A	**A**	**641,004**	**663**	**364**
DLØAZ	*	435,344	549	368
			(Op: DHØGDS)	
DL8OBF	*	416,740	568	335
PAØJNH	**A**	**384,476**	**546**	**347**
JO7KMB	**A**	**334,560**	**453**	**272**
VK6KK	**A**	**287,820**	**410**	**246**
MØCCE	*	277,760	458	310
KP4JRS	**A**	**238,355**	**393**	**247**
MM5AHO	**A**	**163,586**	**348**	**263**
UR7IRL	**A**	**81,890**	**245**	**190**
OY1CT	**A**	**57,905**	**250**	**185**
SP6RLK	**A**	**14,925**	**77**	**75**
DF5AU	*	2,726	32	29
UN5J	**28**	**109,120**	**254**	**155**
KG4WW	**21**	**3,108,072**	**2036**	**671**
ZC4LI	**21**	**1,572,480**	**1280**	**455**
OH3BU	**14**	**496,218**	**812**	**433**
GU4EON	**3.7**	**116,427**	**256**	**197**
YTØT	**1.8**	**90**	**6**	**6**
***UA4LCQ/9**	**A**	**2,261,340**	**1367**	**612**
***EX2X**	**A**	**2,181,292**	**1426**	**587**
*UA9ACJ	*	1,183,104	818	384
***4F1MEU**	**A**	**1,027,752**	**950**	**374**
***YL2TW**	**A**	**1,003,220**	**1019**	**515**
*UA9XF	*	941,660	723	394
***UA3ABJ**	**A**	**929,856**	**860**	**464**
***DB8NI**	**A**	**840,788**	**872**	**481**
*RV9UP	*	774,060	784	380
***S57NRO**	**A**	**767,360**	**797**	**436**
***EI6JK**	**A**	**687,280**	**749**	**440**
***VE3JAQ**	**A**	**653,627**	**590**	**367**
***PG3N**	**A**	**510,734**	**664**	**382**
***VO2ZT**	**A**	**446,682**	**495**	**327**
***LU5FF**	**A**	**380,996**	**457**	**308**
***HZ1EX**	**A**	**360,573**	**463**	**263**
***VE3KP**	**A**	**343,175**	**415**	**265**
***3Z7SZ**	**A**	**340,275**	**485**	**325**
*UA3LHL	A	301,474	468	307
***EA4TV**	**A**	**301,103**	**482**	**341**
***OZ1ACB**	**A**	**300,737**	**477**	**311**
***G4DFI**	**A**	**263,417**	**440**	**311**
*VE3RCN	*	258,516	359	258
*AN7AFM	*	248,412	504	326
***VE1YDX**	**A**	**233,864**	**318**	**248**
			(Op: VE1JS)	
*RA4LE	*	212,232	445	296
*YL2VW	*	196,762	362	262
***VA7LC**	**A**	**182,750**	**317**	**215**
***VE9NC**	**A**	**168,861**	**256**	**231**
*DL9GWD	*	150,500	305	215
***F5LIW**	**A**	**130,168**	**259**	**212**
*AN1TU	*	107,800	221	200
***UX8IR**	**A**	**104,804**	**262**	**197**
***TI9Y**	**A**	**98,072**	**215**	**184**
*UA9LCY	*	87,164	204	154
*VE7NS	*	84,231	203	147
***SMØB**	**A**	**82,812**	**250**	**201**
			(Op: SM5QU)	
***ON4AST**	**A**	**78,142**	**214**	**178**
*PA7AL	*	69,480	221	180
***PY2DA**	**A**	**50,568**	**150**	**129**
*VE3NK	*	47,502	145	117
***OK1CJN**	**A**	**36,630**	**133**	**111**
***JR1MRG**	**A**	**34,040**	**137**	**92**
***YO4AUP**	**A**	**29,590**	**132**	**110**
*MØLET	*	26,752	136	128
*SP9LWH	*	24,926	117	103
*PAØOI	*	22,568	114	104
*PG2AA	*	16,530	98	87
***YV5JBI**	**A**	**14,790**	**65**	**58**
*JJØAEB	*	13,440	78	70
***HS1OVH**	**A**	**9,804**	**66**	**57**
*JR2SOU	*	3,536	47	34
***7N2UQC**	**28**	**13,266**	**94**	**67**
***OH6LHB**	**21**	**108,647**	**275**	**187**
***YC2ECG**	**21**	**70,738**	**218**	**113**
***OZ8AE**	**21**	**32,704**	**126**	**112**
***VE1OP**	**14**	**183,138**	**366**	**233**
***PR7AYE**	**14**	**27,260**	**104**	**94**
***YY5YMA**	**3.7**	**189,406**	**203**	**166**
***YT2W**	**1.8**	**7,524**	**62**	**57**

ROOKIE

UN7MMM	**A**	**1,718,147**	**1029**	**461**
UW1GZ	**A**	**1,622,948**	**1487**	**604**
YB1AR	**A**	**890,226**	**733**	**411**
VY1CG	**A**	**103,179**	**247**	**163**
DL5SDK	**A**	**102,834**	**248**	**197**
RX9JD	**A**	**84,624**	**192**	**164**
PY2EYE	**A**	**34,138**	**124**	**101**
EA2BOV	**21**	**717,990**	**751**	**390**
MØWKR	**14**	**1,225,887**	**1057**	**559**
***CT7B**	**A**	**6,135,116**	**2610**	**929**
			(Op: CT1ILT)	
***SQ9JKW**	**A**	**1,166,790**	**996**	**534**
***UR5MNZ**	**A**	**1,042,797**	**986**	**483**
***EA2AYD**	**A**	**953,865**	**865**	**517**
***HB9TQG**	**A**	**444,105**	**589**	**355**
***SM6U**	**A**	**440,190**	**594**	**365**
			(Op: SM6YOU)	
***DC7NF**	**A**	**402,215**	**555**	**355**
***YY5EAH**	**A**	**390,528**	**429**	**288**
***M3VZT**	**A**	**305,915**	**479**	**305**
*DM2SR	*	291,096	454	311
***TF3XEN**	**A**	**282,360**	**590**	**362**
***F4DLL**	**A**	**166,400**	**338**	**260**
*SP1DTE	*	125,756	311	211
*DL5DD	*	123,966	289	213
*DK8EY	*	122,941	254	193
***2MØGUL**	**A**	**111,981**	**295**	**229**
***CQ7IUB**	**A**	**82,080**	**231**	**190**
***ES8DH**	**A**	**74,328**	**206**	**163**
***EI7JK**	**A**	**67,408**	**239**	**176**
***OE8WOQ**	**A**	**55,945**	**219**	**167**
*SA5Y	*	46,953	188	141
*SQ6IU	*	38,376	147	123
*MØOIC	*	29,884	138	124
*M3TGS	*	25,916	137	124
*OE8OLK	*	25,272	134	117
***LA7GNA**	**A**	**21,624**	**128**	**106**
***9H3LEO**	**A**	**17,108**	**134**	**94**
			(Op: K2LEO)	
*DB7TF	*	14,691	95	83
***RK9KWI**	**A**	**11,115**	**75**	**57**
*M1MAJ	*	10,578	85	82
***8G6AHP**	**A**	**10,010**	**80**	**65**
***VP8BKF**	**A**	**9,702**	**74**	**63**
***UA3VFI**	**A**	**4,920**	**64**	**60**
*RA6XB	*	1,276	22	22
*PR7AP	*	686	19	14
***YY5EDG**	**28**	**289,432**	**458**	**242**
***LU9DPM**	**28**	**34,917**	**137**	**113**
***TI2VW**	**21**	**1,348,620**	**1220**	**507**
***YY5RED**	**21**	**596,580**	**652**	**326**
***TA2IB**	**21**	**247,324**	**382**	**242**
***DV3ZQR**	**21**	**125,248**	**290**	**152**
***BV2WS**	**21**	**160**	**10**	**10**
***UA9LAU**	**14**	**1,250,928**	**894**	**511**
***TG9ANF**	**14**	**561,660**	**759**	**345**
***SQ3RX**	**14**	**163,750**	**395**	**250**
***S58L**	**14**	**67,550**	**238**	**175**
***DK2AB**	**14**	**3,900**	**59**	**52**
***M5W**	**7**	**187,512**	**258**	**178**
			(Op: MØMCX)	
***YO9HJY**	**7**	**3,168**	**36**	**36**
***DW1VEU**	**7**	**1,020**	**16**	**15**
***YY5YMA**	**3.7**	**189,406**	**203**	**166**
***SQ5JKS**	**3.7**	**121,011**	**291**	**209**
***OK1CLD**	**3.7**	**5,040**	**53**	**48**
***UA6BQD**	**1.8**	**5,076**	**53**	**47**

BAND LIMITED

YB1AR	**A**	**890,226**	**733**	**411**
CN2US	**A**	**10,672**	**61**	**58**
			(Op: KE1AT)	
MXØCYB/P	**14**	**64,798**	**228**	**179**
			(Op: GØVQR)	
***EC7ABV**	**A**	**276,900**	**496**	**325**
***YO4RST**	**A**	**87,084**	**210**	**164**
***EX8AA**	**A**	**40,320**	**96**	**80**
***JA5EO**	**A**	**27,057**	**126**	**95**
***EC1DMY**	**A**	**24,192**	**130**	**108**
*JL3RDC	*	17,936	92	76
*EC7DDZ	*	7,410	60	57
***ON4KVA**	**A**	**7,130**	**66**	**62**
*RW3SU	*	240	10	8
***YY5EDG**	**28**	**289,432**	**458**	**242**
***PY3YD**	**28**	**36,822**	**135**	**114**
*PY2SRB	*	33,354	126	109
*YY5OGI	*	72	6	6
***EC8ADU**	**21**	**1,250,480**	**958**	**440**
***EC7AKV**	**21**	**114,456**	**318**	**228**
***JP1JIP/7**	**21**	**86,790**	**230**	**165**
*EC1DGX	*	4,784	50	46
*EC1DMQ	*	2,442	34	33
***ES1IP**	*	**1,188**	**22**	**22**
***UA4WEV**	**14**	**90,720**	**288**	**216**
***DB6FO**	**14**	**61,420**	**244**	**166**
***SP5DRE**	**14**	**18,335**	**111**	**95**
***DL4VAI**	**7**	**32,318**	**129**	**113**
***YY5YMA**	**3.7**	**189,406**	**203**	**166**

SINGLE OP ASSISTED

UNITED STATES

WK4Y	**A**	**4,313,415**	**2018**	**807**
			(Op: W4MYA)	
KT4W	*	3,470,845	1935	757
			(Op: N4RV)	
WO8CC	**A**	**3,191,240**	**1845**	**760**
			(Op: N8BJQ)	
W1CU	**A**	**3,053,738**	**1612**	**757**
N4ZZ	*	2,586,204	1848	722
NA7XX	**A**	**2,449,050**	**1880**	**725**
			(Op: WØMU)	
AD4EB	*	2,415,736	1702	691
NN3Q	**A**	**1,775,000**	**1255**	**625**
KW5DX	**A**	**1,757,728**	**1591**	**608**
			(Op: W5BL)	
AB2E	**A**	**1,593,984**	**1248**	**593**
WD4DDU	*	1,313,820	919	540
NX5M	*	1,029,936	1069	516
N3RD	*	915,638	706	446
K3MD	*	897,982	812	466
N3HUV	*	839,040	741	437
N2BJ	**A**	**706,409**	**682**	**431**
W3PT	*	653,268	623	404
KI1E	*	574,117	571	383
W9GE	*	544,452	521	354
WA7LNW	*	534,688	845	392
KW3W	*	502,950	554	350
K5NZ	*	491,883	590	397
K9NW	*	490,147	558	343
K3KO	*	484,596	439	378
KØDG	**A**	**451,500**	**552**	**350**
WA2JQK	*	450,140	505	317
N4GG	*	427,504	544	347
AJ1M	*	380,768	612	326
N5JR	*	370,783	459	343
NO2R	*	331,198	372	287
K5UO	*	286,764	381	276
NW1E	*	272,356	372	284
			(Op: K1JN)	
W3TZ	*	243,712	337	238
W3HVQ	*	196,350	336	238
W2CG	*	194,260	285	220

KE4S	*	186,780	317	220	*EA1DBC	*	188,722	348	254	**SO9HA**		**1,004,160**	**974**	**480**
KM9M	*	122,512	343	208	*EA7TN	*	178,318	346	271	**UZ4E**		**915,153**	**988**	**471**
KØAD	*	120,848	337	208	***AH6NF**	**A**	**156,032**	**287**	**184**	RK4WWF		900,520	1055	470
K8SAK	*	118,922	256	194	*DL2UH	*	145,624	283	218	YL1XN		850,363	927	431
NF1A	*	117,200	262	200	***SP2GCE**	**A**	**106,005**	**233**	**185**	OK1KDO		760,384	799	436
N8IW	*	89,787	238	173	***G3VAO**	**A**	**101,796**	**240**	**204**	RW3WWW		703,449	861	423
N8KDJ	*	83,956	198	151	***RA3CO**	**A**	**101,144**	**242**	**188**	UR4IXM		569,664	715	414
W6EB	**A**	**48,364**	**155**	**113**	***PAØKHS**	**A**	**89,208**	**257**	**189**	GØGHK		479,530	626	395
K4APG	*	37,145	127	115	***VA6XDX**	**A**	**76,270**	**189**	**145**	UT4IYZ		475,167	685	363
K3DNE	*	31,005	147	117	***9A4VV**	**A**	**56,561**	**165**	**163**	RK3AWK		430,780	648	362
KCØRET	*	30,510	146	113	*PH3BOJ	*	48,048	190	154	G1T		417,876	609	359
NØAT	*	24,969	106	87	*RZ6HF	*	46,866	189	146	ED1DX		221,636	371	268
W1EBI	*	9,300	60	60	***JK2VOC**	**A**	**41,552**	**160**	**106**	**CT7Z**		**160,449**	**315**	**237**
W8BS	*	1,998	28	27	*EA4NP	*	34,236	130	108	**PA5W**		**127,820**	**279**	**220**
WF2B	*	1,792	29	28	*OK1FJD	*	31,892	134	119	SP6KFA		116,424	293	198
KM4M	**28**	**137,172**	**321**	**213**	*DL5RDO	*	23,214	115	106	DLØTS		114,784	265	211
			(Op: W3BP)		*DL1NEO	*	15,136	94	86	AM2WP		106,800	264	200
N5MT	**28**	**33,912**	**130**	**108**	***YBØ/HA2VR**	**A**	**11,718**	**66**	**63**	**YO6KNY**		**102,680**	**226**	**178**
KC1ME	**14**	**1,855,235**	**870**	**515**	*EA1FBJ	*	1,848	36	33	DKØGYB		93,200	250	200
			(Op: K1JB)		***HSØZEN**	**A**	**1,080**	**20**	**20**	S5ØD		84,429	240	159
N2UN	**14**	**88,920**	**196**	**180**	*F5JBE	*	336	12	12	RK4LWA		41,712	204	158
N4TL	**14**	**52,662**	**142**	**134**	***PY2XC**	**28**	**106,140**	**248**	**183**	EW6WA		40,300	178	155
K7VIT	**14**	**16,920**	**95**	**90**	***JM1NKT**	**28**	**32,754**	**144**	**103**	LY3TL		17,848	114	97
KEØL	**3.7**	**134,392**	**414**	**214**	***3Z3Z**	**28**	**4,158**	**42**	**33**	YO8KRR		16,344	95	72
***KS1J**	**A**	**691,086**	**637**	**407**				(Op: SQ3ET)		F6KRK		9,164	67	58
***KS2G**	**A**	**563,955**	**619**	**393**	***RUØBB**	**21**	**289,850**	**476**	**275**	SP1YGL		238	7	7
***AB4GG**	**A**	**459,918**	**555**	**334**	***8SØF**	**21**	**5,355**	**53**	**45**					
***N6AJR**	**A**	**212,850**	**452**	**275**				(Op: SMØOGQ)				**OCEANIA**		
***WØMM**	**A**	**151,946**	**318**	**218**	***YZ1V**	**14**	**180,340**	**429**	**284**	**YB2ZDR**		**1,828,190**	**1125**	**533**
***N9LF**	**A**	**143,948**	**307**	**212**				(Op: YT1HA)						
*N2OPW	*	126,224	275	196	*SABQ	*	147,152	425	272			**SOUTH AMERICA**		
*WA1ZYX	*	106,752	246	192				(Op: SMØOGQ)		**LR2F**		**15,358,666**	**4216**	**1094**
*K9DUR	*	99,735	242	183	***EA8AJO**	**14**	**28,518**	**99**	**98**	**PJ4Y**		**12,224,763**	**3681**	**999**
***WB3LGC**	**A**	**99,696**	**250**	**186**	***PU7EEL**	**3.7**	**2,184**	**21**	**21**	**ZY7C**		**11,288,664**	**3340**	**996**
***KA8PTT**	**A**	**76,500**	**195**	**153**	***US6IQE**	**1.8**	**14,700**	**99**	**84**	LTØH		10,741,474	3324	998
*N5FPP	*	62,160	220	148						LT2H		9,134,574	3037	942
*NU6T	*	37,128	157	119						PQ2Q		6,568,211	2507	871
***WA2MNO**	**A**	**32,545**	**152**	**115**						PV2J		4,591,104	1994	784
*AI4IO	*	26,226	118	94						LV1E		1,325,394	1029	471
*N8IK	*	22,680	104	90						LU4DQ		562,261	605	329
*W5CTV	*	21,600	112	90						LU4DLU		132,050	271	190
*KB3KAQ	*	19,364	112	94										
***KT7G**	**A**	**15,987**	**98**	**73**										
*W2SR	*	14,578	79	74										
*K6OWL	*	10,089	70	59										
*KØXD	*	7,208	57	53										
*N1GKI	*	5,952	55	48										
*KØKX	*	3,844	33	31										
*K9OSH	*	1,904	28	28										
*W7SST	*	1,196	26	26										
***KA2DIV**	**28**	**2,016**	**28**	**28**										
			(Op: N4GM)											

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

K3EST	**7,138,096**	**2965**	**952**
NI1N	4,308,405	2097	823
AJ9C	**4,149,184**	**2285**	**832**
KØDU	**3,575,311**	**2466**	**757**
KX7M	**2,680,210**	**1964**	**689**
NN5Z	**1,894,008**	**1731**	**636**
AJ5DX	1,696,065	1235	557
WG7X	**1,131,154**	**1294**	**542**
W5LCC	949,905	1219	495
K4VV	735,546	690	422
WØMAN	570,843	579	357
WK3X	**530,345**	**695**	**365**
N7YX	497,826	687	378
WX7P	461,568	712	384
WF6C	403,749	674	339
NZ1U	**379,140**	**489**	**355**
WZ7M	219,972	462	276
KB1LQD	187,915	369	245
ADØN	125,350	277	218
NE5LL	38,533	147	113
W9NAA	5,934	48	46
NBUZE	**1,829**	**33**	**31**

NORTH AMERICA

HI3CCP	**13,318,272**	**4258**	**1051**
TO1T	**7,872,072**	**3214**	**897**
VE3RM	**6,067,328**	**2214**	**886**
VA7OO	**4,259,520**	**1756**	**720**
VA3YV	1,767,904	1065	547
VA3OC	1,721,947	1076	509
VA2TG	**599,040**	**564**	**390**
VE7FO	**305,760**	**420**	**273**

AFRICA

CQ9K	**21,831,270**	**4861**	**1230**
AN8KV	**964,752**	**753**	**404**

ASIA

5B/AJ2O	**28,966,272**	**6558**	**1252**
8Q7DV	**13,375,950**	**4345**	**1050**
UAØAZA	**8,865,162**	**3075**	**942**
9K2HN	**8,161,560**	**3300**	**792**
UP9L	**4,186,920**	**1868**	**690**
UA9UWA	**2,999,105**	**1725**	**635**
RK9WZZ	1,891,284	1080	508
D7ØYT/5	**1,847,220**	**1368**	**510**
JU1DX	**1,772,352**	**1486**	**544**
JI2ZEY	**1,611,420**	**1094**	**535**
JM1LPN	1,503,744	1032	528
RZ9UWZ	1,395,054	1080	423
RK9CZD	1,124,784	760	438
RZ9WXK	893,604	718	339
DTØHF	621,936	837	336
RK9JWV	475,850	552	310
HLØO	222,768	400	238

EUROPE

OM8A	**13,351,275**	**3947**	**1211**
OM7M	12,209,162	3774	1193
YT6A	**10,424,128**	**3561**	**1144**
GJ2A	**9,366,844**	**3527**	**1084**
TM7F	**8,580,536**	**3271**	**1009**
OL7R	**8,497,635**	**3044**	**1065**
TM4Z	8,123,104	3228	1034
DL6RAI	**7,378,068**	**2899**	**1003**
G6PZ	**6,855,212**	**2777**	**1018**
YZ1U	6,471,300	2678	925
RF3A	**6,104,475**	**3000**	**975**
TM8D	5,155,358	2439	851
OL3Z	4,705,910	2280	895
GM8M	**4,554,888**	**2484**	**862**
OL5Q	4,262,004	2171	804
RK3DZB	3,195,964	2029	769
DAØCA	2,969,080	1905	746
RL4W	2,558,840	2071	680
YL1S	**2,402,262**	**1732**	**666**
YZ7A	2,394,270	1695	666
RK6HWR	2,362,305	1953	695
RZ4CWW	2,013,597	1546	687
SX8M	**1,998,570**	**1724**	**651**
GW9T	**1,832,824**	**1505**	**644**
UV2L	1,823,203	1437	571
DL6EZ	1,791,050	1233	634
DLØGL	1,438,844	1160	583
S54K	**1,360,389**	**1111**	**547**
S55W	1,353,600	1098	564
M4U	1,315,953	1199	549
OK1KDT	1,297,673	1055	577
OL5T	1,151,196	1011	516

MULTI-OPERATOR TWO TRANSMITTER

UNITED STATES

WR3Z	**8,320,680**	**3500**	**1044**
NX6T	**5,335,588**	**3414**	**796**
WX5S	4,954,104	3074	829
NG3U	3,566,914	2027	793
AG1C	**595,525**	**666**	**415**
NN5AA	**97,092**	**241**	**186**

DX

PJ2T	**31,891,725**	**7124**	**1225**
TS3A	**30,460,277**	**6650**	**1139**
ZW5B	**27,390,828**	**6639**	**1308**
KH7X	**20,910,656**	**5387**	**1066**
ES7BQ	**13,970,739**	**4683**	**1173**
SQ6Z	**9,588,504**	**3378**	**1048**
VE7SV	**9,248,472**	**3372**	**846**
VP9I	**7,236,456**	**3225**	**844**
PS2T	5,015,087	2003	847
VE6FI	**3,237,876**	**1862**	**636**
SZ5Z	**3,181,473**	**2741**	**747**
RY9C	**2,947,466**	**1513**	**634**
CV5D	**1,022,400**	**908**	**400**
9A7P	**991,825**	**1003**	**485**
VE7SCC	974,169	809	423
LU8XW	**923,049**	**745**	**459**
B3C	**770,587**	**1090**	**379**
DZ9DZ	640,336	720	248
YL38ØXF	189,250	369	250

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

NQ4I	**15,111,810**	**6236**	**1190**
NR6O	**7,766,641**	**4652**	**907**
KT9M	**4,109,525**	**2479**	**805**
NE1C	**3,642,108**	**1951**	**827**
WX3B	**2,548,660**	**1657**	**706**
NE3MD	209,880	488	264
W5BLW	**61,701**	**283**	**157**

DX

YW4M	**32,163,974**	**7153**	**1291**
OT5A	**22,915,900**	**6646**	**1330**
LZ9W	**21,875,384**	**6734**	**1349**
UPSG	**21,245,870**	**5955**	**1155**
LY7A	**12,116,478**	**4726**	**1122**
LX5A	**11,350,185**	**4526**	**1085**
ZL1V	**10,881,579**	**3375**	**933**
RX4HZZ	**9,325,820**	**4401**	**1015**
T49C	**8,297,978**	**3814**	**878**
DL9LR	**7,300,128**	**3399**	**992**
UT2IWT	**4,101,396**	**2427**	**793**
OD5WPX	**3,568,160**	**1835**	**580**
BPØA	**3,258,755**	**2709**	**659**
VE5RI	**2,097,600**	**1446**	**570**
UX4E	298,808	493	328
OH2K	**212,182**	**395**	**277**
UZØG	37,605	139	115

DX

OE4A	**A**	**10,628,416**	**3641**	**1136**										
			(Op: OE1EMS)											
RG9A	**A**	**7,808,760**	**2685**	**796**										
			(Op: UA9AM)											
LO2F	**A**	**7,215,124**	**2658**	**889**										
			(Op: LU1FAM)											
RL3A	**A**	**6,857,280**	**2981**	**960**										
			(Op: UA3ASZ)											
DL1IAO	**A**	**5,687,130**	**2455**	**879**										
YR7M	**A**	**5,112,026**	**2558**	**874**										
			(Op: YO9GZU)											
DJ5MW	*	5,089,020	2387	890										
S53O	**A**	**4,151,672**	**2017**	**833**										
XE1KK	**A**	**4,068,562**	**2041**	**734**										
OH6NIO	**A**	**3,836,794**	**2214**	**853**										
W1AJT/VE3	**A**	**1,935,560**	**1097**	**583**										
UABSE	**A**	**1,174,680**	**1029**	**468**										
DL4RCK	*	989,664	845	507										
OHØI	**A**	**869,484**	**963**	**462**										
			(Op: OH9MM)											
9A8A	**A**	**800,856**	**773**	**441**										
HZ1IK	**A**	**716,441**	**532**	**341**										
YT5T	**A**	**636,800**	**736**	**398**										
DL5MEV	*	468,720	491	378										
OK2ZW	**A**	**273,714**	**397**	**266**										
DK1MM	*	253,935	401	285										
DJ3WE	*	218,276	377	277										
RAØAM	*	205,555	346	245										
PA9ZZ	**A**	**174,087**	**348**	**261**										
DK3GI	*	101,304	226	189										
RU6YY	*	83,398	196	161										
JS1KQQ	**A**	**67,980**	**186**	**132**										
DK3QJ	*	53,312	155	136										
OH1MM	*	43,210	169	149										
G3UEG	**A**	**38,480**	**144**	**130**										
DG8LAV	*	21,808	104	94										
DF3CB	*	2,225	29	25										
LQ5H	**28**	**1,396,278**	**1072**	**459**										
			(Op: LU3HS)											
UA9UR	**28**	**70,875**	**207**	**125**										
OH6NJ	**28**	**41,412**	**154**	**102**										
LY2IC	**28**	**2,520**	**32**	**30**										
4N1SM	**21**	**2,038,260**	**1308**	**633**										
YT1BB	*	1,391,452	1038	541										
YO9HP	**21**	**902,880**	**812**	**456**										
DL9EE	**21**	**446,395**	**521**	**365**										
DL4NN	*	62,238	163	138										
RA3DNC	**21**	**37,761**	**137**	**123**										
S57IIO	**14**	**3,612,497**	**2099**	**791**										
OE2S	**14**	**3,550,506**	**1977**	**838**										
			(Op: OE2VEL)											
DL3NED	**14**	**2,959,440**	**1702**	**760**										
DL2YL	*	1,569,792	1262	584										
AM5YJ	**14**	**583,626**	**996**	**461**										
			(Op: EA5YJ)											
DH5HV	*	398,183	557	361										
5Y6Y	**14**	**191,828**	**413**	**221**										
9A3ND	**14**	**16,799**	**107**	**107**										
			(Op: 9A1AA)											
VY1MB	**14**	**4,972**	**56**	**44**										
OM7PY	**7**	**95,700**	**216**	**174**										
9A1CCY	**7**	**90,828**	**223**	**174**										
			(Op: 9A5TO)											
OH6YF	**7**	**1,054**	**17**	**17**										
OZ1ADL	**3.7**	**752,130**	**786**	**411**										
SN6C	**1.8**	**431,624**	**612**	**326**										
			(Op: SP6CZ)											
***PR7AB**	**A**	**1,726,445**	**1075**	**535**										
***EA1DAX**	**A**	**520,773**	**584**	**367**										
***DJ3HW**	**A**	**519,860**	**545**	**374**										
*DL8AAM	*	472,512	598	368										
***XE1MEX**	**A**	**393,366**	**438**	**318**										
***S59W**	**A**	**342,304**	**464**	**304**										
***OK1UU**	**A**	**301,785**	**441**	**295**										
*DL7NFK	*	283,122	427	294										
***UAØFGZ**	**A**	**217,778**	**369**	**209**										
***HS1PDY**	**A**	**196,460**	**341**	**235**										

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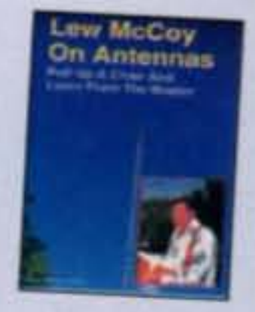

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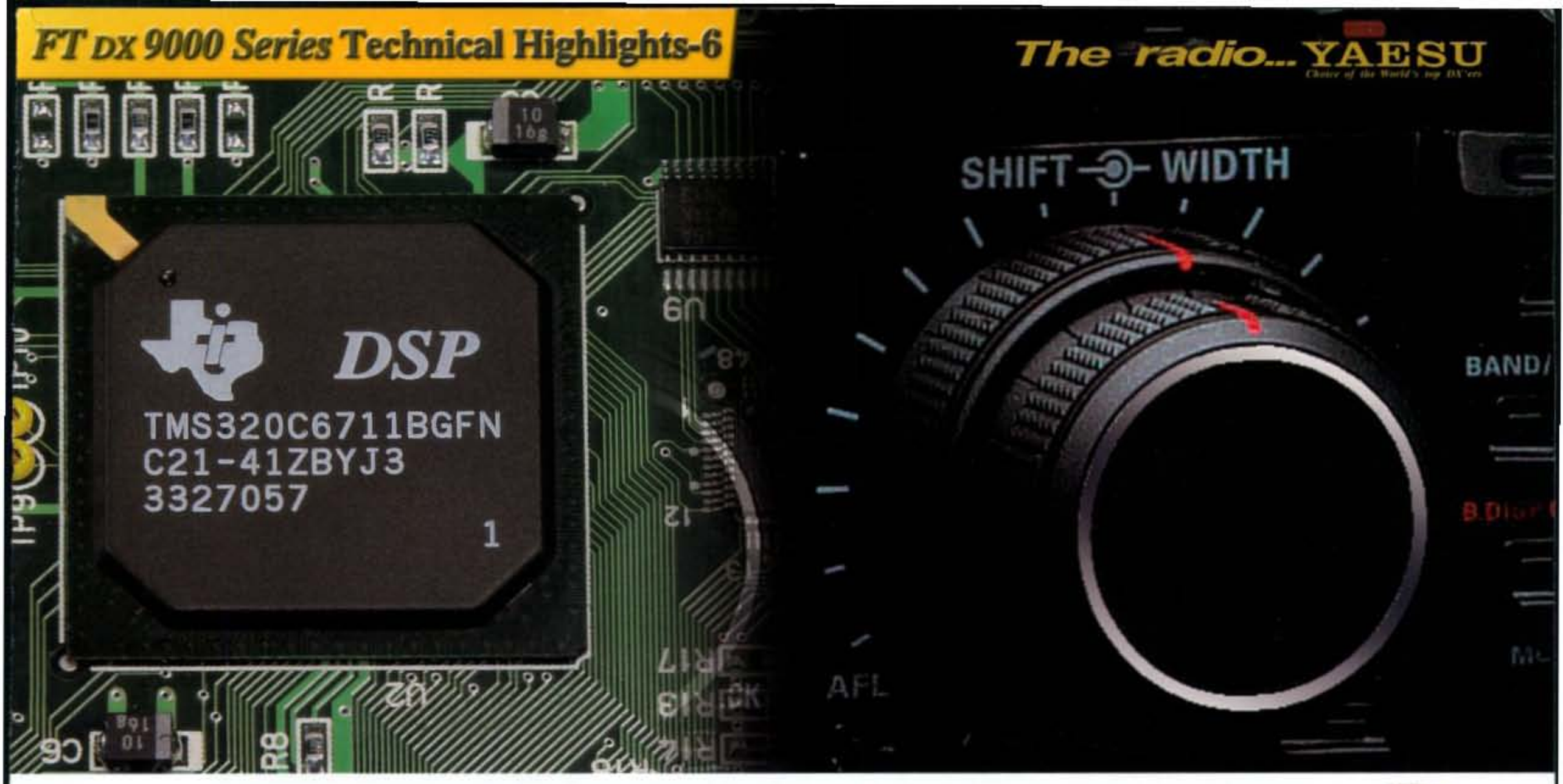
FT DX 9000 Series Technical Highlights-6



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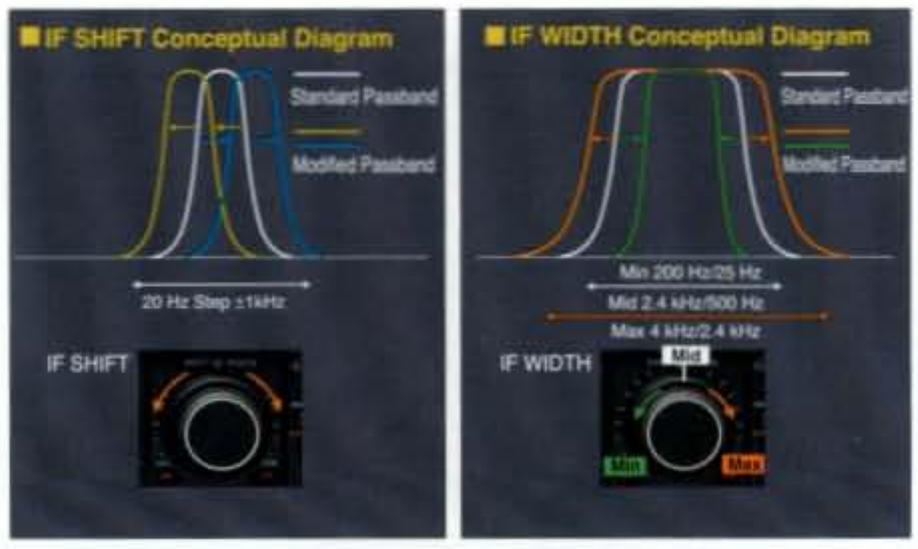

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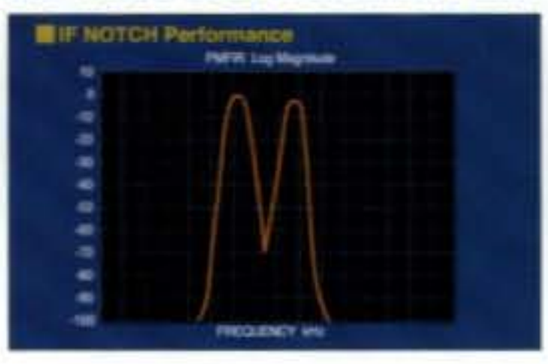
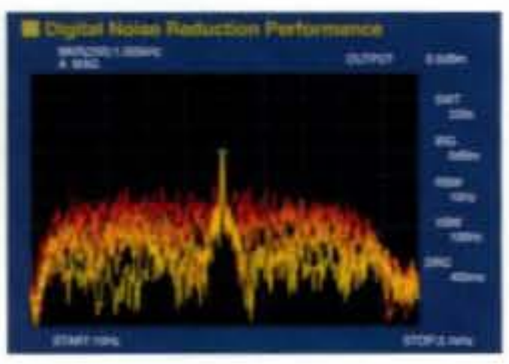


Digital Noise Reduction



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Two Pairs of Meters, plus LCD Window; Data Management Unit and Flash Memory Slot Built In.
Main/Sub Receiver VRF, plus Full Dual Receive Capability.
External 50 V/24 A Switching Regulator Power Supply and Speaker with Audio Filters

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